A STUDY ON ECONOMIC IMPACT OF WEATHER BASED CROP INSURANCE SCHEME ON FARM INCOME IN SALEM DISTRICT OF TAMIL NADU

By

T. ARUN,B.Sc (Ag)

I.D.No. 09-601-003

DEPARTMENT OF AGRICULTURAL ECONOMICS

CENTRE FOR AGRICULTURAL AND RURAL DEVELOPMENT STUDIES

TAMIL NADU AGRICULTURAL UNIVERSITY

COIMBATORE – 641 003

2011

A STUDY ON ECONOMIC IMPACT OF WEATHER BASED CROP INSURANCE SCHEME ON FARM INCOME IN SALEM DISTRICT OF TAMIL NADU

Thesis submitted in partial fulfillment of the requirement for the degree of

MASTER OF SCIENCE (AGRICULTURE) IN AGRICULTURAL ECONOMICS

to the Tamil Nadu Agricultural University, Coimbatore – 641 003

By

T.ARUN, B.Sc(Ag)

I.D.No. 09-601-003

DEPARTMENT OF AGRICULTURAL AGRICULTURAL ECONOMICS

CENTRE FOR AGRICULTURAL AND RURAL DEVELOPMENT STUDIES

TAMIL NADU AGRICULTURAL UNIVERSITY

COIMBATORE – 641 003

2011

CERTIFICATE

This is to certify that the thesis entitled "**A STUDY ON ECONOMIC IMPACT OF WEATHER BASED CROP INSURANCE SCHEME ON FARM INCOME IN SALEM DISTRICT OF TAMIL NADU"** **Submitted** in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE (AGRICULTURE)** in the **DEPARTMENT OF AGRICULTURAL ECONOMICS** to the Tamil Nadu Agricultural University, Coimbatore. It is a record of bonafide research work carried out by **Mr.ARUN.T** under my supervision and guidance and that no part of this thesis has been submitted for the award of any other degree, diploma, fellowship or other similar titles or prizes and that work has not been published in part or full in any scientific or popular journal or magazine.

Place: Coimbatore **Dr.K.MANI**

Date : Chairman of Advisory Committee

Approved By

Chairman : **(Dr.K.MANI)**

Members : **(Dr.P.PARAMASIVAM)**

: **(Dr.R.VENKATRAM)**

T. ARUN 2011

T. ARUN 2011

T. ARUN 2011

ABSTRACT

A STUDY ON ECONOMIC IMPACT OF WEATHER BASED CROP INSURANCE SCHEME ON FARM INCOME IN SALEM DISTRICT OF TAMIL NADU

By

ARUN.T

Degree : Master of Science (Agriculture) in Agricultural Economics

Chairman : Dr. K. MANI,

Professor,

Department of Agricultural Economics,

Tamil Nadu Agricultural University,

Coimbatore - 641 003.

2011

Agricultural insurance benefits farmers to stabilize farm income and investment and guard against disastrous effect of losses due to natural hazards or low market prices. Crop insurance not only stabilizes the farm income but also helps the farmers to initiate production activity after a bad agricultural year.

Weather Based Crop Insurance seeks to provide farmers compensation in case of happening or non-happening of a specific weather event that is likely to have bearing on the crop yields. In other words, the weather index measures a specific weather variable (e g, rain-fall, temperature, relative humidity, wind speed, etc) and pays indemnities based not on the actual losses experienced by the insured, but rather on the realizations of the index (that proxies the loss in yield owing to the adverse weather incidence).

The present study mainly focuses on impact of Weather Based Crop Insurance Scheme in Salem district in terms of coverage of financial loss due to adverse weather parameters and generation of increased farm income, and also to assess the extent of crop loss and financial support, problems faced by the farmers and suggest solutions for further refinement of the

scheme. This study was conducted in Salem district in Tamil Nadu. Data were collected from 120 farm households in total spread over 7 villages with three categories of Insured and Benefitted Farmers (IBF), Insured but Not Benefitted Farmers (INBF) and Non Insured Farmers (NIF). It was decided to select Sixty IBF who borrowed short term credit for the year 2009-10 and obtained the benefit of Weather insurance, i.e., indemnity and thirty INBF (covered under WBCIS 2009-10) who did not obtain indemnity. Thirty Non Insured Farmers (who were not covered under WBCIS during 2009-10) were also selected randomly from the villages where IBF and INBF.

The Weather Based Crop Insurance Scheme was implemented in India during Khariff season of 2007 in Karnataka state on pilot basis. Rajasthan has remained the dominant state with 60 per cent of the total number of farmers insured and accounting for almost half of the total area, liability and premium generated. Food crops and oilseeds accounted for more than 80 per cent of the coverage, insurance value and total premium generated and they also registered more than 90 per cent of the total indemnity payouts.

The Weather Based Crop Insurance Scheme in Tamil Nadu was implemented from kharif season of year 2008. At the beginning of the scheme, i.e., kharif 2008, 40.6 per cent of total numbers of the farmers covered under WBCIS were benefitted. This number of benefitted farmers was gradually decreasing and at the Rabi 2009-10, it was only at 5.5 per cent. There was also a wide year-to-year fluctuations in case of number of farmers covered and settled with claims.

The WBCIS in Tamil Nadu was implemented in five districts of Tamil Nadu, namely, Ariyalur, Dharmapuri, Perambalur, Salem and Virudhanagar. Perambalur was in first rank in terms of number of farmers included, area covered and sum insured and it was followed by Salem district. In Salem district, during kharif 2009 the total premium collected was Rs.81.01 lakhs whereas total claim given was only Rs.5.45 lakhs, that is, only 6 per cent of total premium was settled as claims. Out of 2308 farmers, only 170 farmers have been benefitted by this scheme accounting for 7.4 per cent.

On an average, the size of net operated holding of the sample farmers was 1.35 ha. In case of Non Insured Farmers, it was 1.82 ha, 1.07 ha for Insured and Benefitted Farmers and 1.16 ha for Insured but Not benefitted Farmers. Cropping intensity was higher in insured farm (134.38 per cent) category followed by Non- Insured Farmer (127.81 per cent). Asset value was more in case of Non Insured Farmers (Rs.1,24,766) followed by Insured Non Benefitted Farmers (Rs. 1,10,253) and Insured Benefitted Farmers (Rs.98,676). NIF had more number of livestock when compared to that of Insured farmers. Paddy, groundnut, pulses, maize and tapioca were the major crops grown by the sample respondents. Paddy occupied more than 35 per cent (about one-third) of the total cultivated area by all the sample respondents. Next to paddy, groundnut occupied a larger area (32 per cent) under cultivation by all the sample respondents.

Total cost was higher (Rs. 39552) in case of Non Insured Farmers followed by Insured but Not benefitted Farmers (Rs 34031) and Insured and Benefitted Farmers (Rs. 31831). In case of paddy, high productivity (3599 kg /ha) was realized by insured and non claim settled farmers, while productivity level of 3568 kg/ha was realized by non-insured farmers and the insured and claim settled farmers realized a lower productivity level (3212 kg/ha).

Maximum productivity in case of groundnut (1445 kg /ha) was realized by non-insured farmers, while productivity level of 1371 kg/ha was realized by insured but not claim settled farmers and insured claim settled farmers had a lower productivity level of 1297 kg/ha. The average crop income in case of Insured and Benefitted Farmer (IBF) (Rs. 42,427) was lower than Insured but Non Benefitted Farmer (INBF) (Rs.49,205) and Non Insured Farmers (Rs.51,636) . The share of crop income of IBF was also lesser (69 per cent of the total farm income) than that of INBF (73 per cent).

The percentage of crop loss varied from 00.02 per cent to 12.48 per cent during the season of kharif 2009 in the farms of the sample respondents. In case of paddy, Insured and Benefitted Farmers accounted for the 8 per cent of the crop loss whereas Insured but Not benefitted Farmers did not account for any loss, whereas non-insured farmers accounted for 4 per cent of crop loss. In case of groundnut, the crop loss faced by Insured and Benefitted Farmers was more (12 per cent) , followed by Insured but Not benefitted Farmers accounting for 7 per cent of crop loss, and Non Insured Farmers were facing less than 1 per cent of crop loss.

The financial support provided for the insured farmers for paddy was more (Rs. 7451) when compared to that of groundnut (Rs. 1702) even though ground nut accounted for more crop loss(12 per cent) when compared to that of paddy (8 per cent). Insured but Not benefitted Farmers have accounted for 7 per cent of crop loss in ground nut.

The loss restored by the insures for paddy was very high (224 per cent) and for groundnut it was only 42 per cent.

Financial security and banks' compulsion were the major reasons for the undertaking of weather insurance. More than two thirds of the insured farmers were unaware of loss assessment method and claim procedure. Many of the non benefited and benefited groups were not satisfied with the claim procedure. None of the insured farmers got compensation at the right time i.e., 45 days after the end of the season. The major reasons of non-insured farmers for not availing the insurance scheme were due to lack of necessity to undertake the scheme. Most of the insured and non-insured farmers suggested that terms of crop insurance should be based on Multi peril effects. The main suggestions of the insured and non-insured farmers for the improvement of the existing weather based crop insurance scheme were the quick settlement of claims and reduction in premium rate.

Based on the results of the study the following policy options are drawn.

Insurance literacy among insured and Non-insured farmers should be increased. Reference Unit Area as an unit for assessing weather parameters needs consideration on priority basis by lowering the insurance unit to village level to avoid the basis risk, that arises between villages and between farms affected by weather parameters. Investment in infrastructure like automatic rain gauges and data collection system will help in offering precise weather data. Proper monitoring of the time regarding the settlement of the claims through creating insurance cell for every Reference Unit Area requires urgent attention. Further more research can be done to evolve location specific insurance products. Co-operatives need to be strengthened by educating their members about the importance of the weather insurance.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

CHAPTER I

INTRODUCTION

Agriculture, as the largest private enterprise in India, provides not only the food and livelihood security but also supports for the economic growth and social transformation of the country. During 2008-09, the agricultural sector contributed to 15.7 per cent of India's GDP and 10.2 per cent of total exports besides providing employment to around 58.2 per cent of the work force. In the recent past, the impact of various foods, financial and economic crises has been felt across the world and this has compromised the lives, livelihood and food security of the people. Therefore, there is a compelling case for increased investment in agricultural sector which would pave way for continued high growth of agriculture in order to meet the food and nutritional security requirements of the people and provide livelihood and income in rural areas. Agriculture will continue to have the pride of place in national policies and plans, since the nation's food security depends on the performance of the agricultural sector.

The enterprise of agriculture is subject to many uncertainties. Yet, more people in India earn their livelihood from this sector than from all other economic sectors put together. In rural India, households that depend on income from agriculture (either self employed or as agricultural labour) accounted for nearly 70 per cent of the population (Survey of Consumption Expenditures, National Sample Survey, 1999/00). Seventy five per cent of all rural poor were in households that were dependent on agriculture, in some way or other. Households that were self-employed in agriculture, accounted for 28 per cent of all rural poor, while households that were primarily dependent on agriculture as labour, accounted for 47 per cent of all rural poor. However, these rural households were inflicted by the low income generation which was mainly due to high degree of uncertainties encountered in the realization of farm income.

1.1 Risk in Agriculture

Agriculture production and the resultant farm incomes in India are frequently affected by natural disasters such as droughts, floods, cyclones, storms, landslides and earthquakes. Susceptibility of agriculture to these disasters is compounded by the outbreak of epidemics and man-made disasters such as fire, sale of spurious seeds, fertilizers and pesticides, price crashes etc. All these events which are beyond the control of the farmers severely affect them through loss in production and farm income. With the growing commercialization of agriculture, the magnitude of loss due to unfavorable eventualities is increasing. Nearly two thirds of the cropped acreage is vulnerable to drought in different degrees. On an average, 12 million hectares of cropped area is affected annually by these calamities severely impacting the yields and total agricultural production.

Agricultural risks are exacerbated by a variety of factors, ranging from climate variability and change, to frequent natural disasters, uncertainties in yields and prices, weak rural infrastructure, imperfect markets and lack of financial services including limited span and design of risk mitigation instruments such as credit and insurance. These factors not only endanger the farmers' livelihood and incomes but also undermine the viability of the agriculture sector and its potential to become a part of the solution to the problem of endemic poverty of the farmers and the agricultural labor. The vulnerable groups like agricultural laborers and sharecroppers also face a variety of risks which have a bearing on their steady flow of income and their ability to build income generating assets.

There are many tools available to help farmers manage production risks. Which tools a farmer uses should depend on his individual farm situation and risk-bearing willingness and ability. A major tool to reduce production risk is insurance. Crop Insurance policies are designed to protect farmers against yield loss from natural causes such as adverse weather conditions, disease, and insects. More specifically, weather based crop insurance is one of the financial tools agricultural producers can use to mitigate the risks associated with adverse natural events—events like climate change may render more frequent and more severe financial loss in the future.

Agricultural insurance benefits farmers to stabilize farm income and investment and guard against disastrous effect of losses due to natural hazards or low market prices. Crop insurance not only stabilizes the farm income but also helps the farmers to initiate production activity after a bad agricultural year. It cushions the shock of crop losses by providing farmers with a minimum amount of protection. It spreads the crop losses over space and time and helps farmers make more investments in agriculture.

1.2 Weather Insurance in India

In India, two types of crop insurance products, viz., (i) Yield index based crop insurance and (ii) Weather index based insurance are in vogue. In India, weather-based crop insurance was first introduced in 2003 by ICICI Lombard with technical assistance from the World Bank in order to help groundnut and castor farmers of Mahbubnagar district in Andhra Pradesh, a region characterized by low and uncertain rainfall, low levels of irrigation, and shallow and infertile soils. About 154 groundnut farmers and 76 castor-bean farmers participated in the scheme in 2003 and 430 farmers insured their crops in the following year for an average sum insured of Rs.6,000. About 305 farmers of the 657 insured farmers in the first two years received pay-outs, with the average pay-out of approximately Rs. 1,475. The company in conjunction with the Government of Rajasthan, also launched a weather insurance programme in 2004, insuring 783 orange farmers and 1,036 coriander farmers, which was scaled up to include more crops and farmers in 2005. IFFCO-Tokio, a joint venture insurance company, launched a similar weather insurance contract, selling more than 3,000 policies in 2004 and it was subsequently increased to 16,000 in 2005. This was followed by the pilot rainfall insurance scheme in 2004-05 in Andhra Pradesh, Karnataka and Gujarat.

The early pilot schemes offered by the private sector were followed by the entry of the public sector insurer, Agricultural Insurance Company of India Limited (AICIL), New Delhi into this market with the introduction of rainfall insurance scheme (Varsha Bima) targeting three risks: sowing failure due to inadequate rainfall at the start of the season, inadequate rainfall during critical stages of crop development and inadequate rainfall over the entire cropping cycle. Under sowing failure option, the coverage is against adverse deviations of 40 per cent and beyond in “actual rainfall” from “normal rainfall” between 15 June and 15 August. Under the seasonal rainfall option, coverage is against adverse deviations of 20 per cent and beyond in “actual rainfall” from “normal rainfall” for the entire season. The payout structure, designed on the basis of yield output elasticity, is on a graded scale, corresponding to different degrees of adverse deviation in rainfall, with the full sum insured for adverse deviation beyond 80 per cent. For rainfall distribution index option, coverage is against deviations of 20 per cent and beyond in “actual rainfall index” from “normal rainfall index” for the entire season. Varsha Bima was piloted in 20 rain gauge areas spread over 27 districts of four states of Andhra Pradesh, Karnataka, Rajasthan and Uttar Pradesh in 2004-05. In the following year, the scheme was extended to 142 districts in 10 states viz, Andhra Pradesh, Gujarat, Maharashtra, Madhya Pradesh, Karnataka, Orissa, Tamil Nadu, Uttar Pradesh, Chhattisgarh and Uttarakhand. The coverage expanded from 1,100 farmers in 2004 to 1.25 lakh farmers in 2005 and to more than seven lakh farmers in 2008.

In 2005, with technical inputs from the Coffee Board and Central Coffee Research Institute, AICIL developed a product for coffee farmers in Karnataka, which was later on extended to the states of Tamil Nadu and Kerala. The scheme compensates the insured against the likelihood of diminished output resulting from shortfall/excess in the actual rainfall for different coverage options within a specific geographical location and specified time period. Since 2007, the Coffee Board has been extending 50 per cent subsidy to the small growers who had land holdings below 10 hectares. In its three years of implementation, around 30,000 farmers have been insured generating a total premium of around Rs 6 crore. The product has however resulted in high losses for the insurer with the indemnity payouts exceeding three times the premium received.

Another product introduced in 2005 targeted wheat in parts of Haryana and Punjab states, and used the remotely sensed Normalized Difference Vegetation Index (NDVI) as a proxy for crop health. However, this has encountered problems due to cloud cover during critical crop growth periods. A generic product was also developed by AICIL for protection against adverse temperature deviations and unseasonal rainfall and implemented in Madhya Pradesh, Uttar Pradesh, Rajasthan and Maharashtra in 2006. The crops covered were potato, mustard, chickpea, barley and wheat. Similar index products have also been developed for about 30 different crops, including perennial horticultural crops such as cashew nut, grapes, mango and apple.

However, the coverage remained limited as all the above initiatives on the part of insurers suffered from lack of government support, making the premium rates seemingly unaffordable. This continued till 2007-08, when the Government of India for the first time earmarked Rs 100 crore for the implementation of the Weather-Based Crop Insurance Scheme (WBCIS) on a pilot basis in a few states as an alternative to NAIS. Piloted by the AICIL in Karnataka in kharif 2007, weather-based schemes are presently being offered in selected regions for different crops by both the public and private sector insurers.

The WBCIS operates on the concept of “area approach” (as adopted under NAIS), whereby each Reference Unit Area (RUA) is linked to a Reference Weather Station (RWS) and all farmers in a given RUA are deemed to have suffered the same level of adverse weather incidence. To the extent possible, such RUAs are restricted to 25 km radius around the RWS. The risk period under weather insurance products extends from sowing to harvesting and thus varies from crop to crop. The payout structure that defines the scale of payout for a given strike and exit in different coverage packages is specific to a particular crop in a notified RUA. The WBCIS is based on actuarial rates of premium (with a cap at the rate of 8-10 per cent for food crops and oilseeds and 12 per cent for commercial crops) but to make it affordable, the premium actually charged from farmers has been fixed “at par” with the NAIS. The scheme operates with upfront premium subsidy contribution by the government (central and state), with the same level of financial support to the public and private insurers, while the entire claims are borne by the insurers.

1.3 Salient Features of Weather Insurance

Weather insurance seeks to provide farmers compensation in case of happening or non-happening of a specific weather event that is likely to have bearing on the crop yields. In other words, the weather index measures a specific weather variable (e g, rain-fall, temperature, relative humidity, wind speed, etc) and pays indemnities based not on the actual losses experienced by the insured, but rather on the realizations of the index (that proxies the loss in yield owing to the adverse weather incidence). The product, designed after a critical study of the weather parameters affecting the crop growth in its various phases, specifies a threshold and a limit that establish the range of values over which indemnity payments are made. The contract is based on the burn rate approach that establishes criteria for a specific event risk and uses at least 25 years of historical data on an annual basis to determine the frequency and magnitude of the occurrence of a specific event. Weather insurance has clearly expanded the domain of crop insurance programme (popularly known as the National Agricultural Insurance Scheme or NAIS) in the country as insurance can now also be provided for crops with no historical yield data and also for horticultural crops where age group-wise yield estimates are not available.

1.4 Progress of Weather Insurance in India and Tamil Nadu

The coverage of the scheme has been increasing with the expansion of the scheme to more number of notified areas and crops. Table 1.1 shows the season-wise progress of the scheme in India. The scheme has been implemented in Kharif 2007 (1 State), Rabi 2007- 08 (4 States), Kharif 2008 (10 States), Rabi 2008-09 (11 States), Rabi 2009-10 (10 states) and Kharif 2010 (16 states).

Table 1.1: Season-wise Farmers Covered and Benefited, Area Covered and Claims Settled under Pilot Weather Based Crop Insurance Scheme in India

Season wise	No of Implementing States	Farmers Insured	Percent to total	Area Covered (Ha.)	Percent to total	Claims Settled (Rs. in Lakh)	Percent to total	Farmers Benefited	Percent to total
Kharif 2007	1	43790	0.63	50075	0.50	524.12	01.12	35275	01.16
Rabi 2007-2008	4	627167	09.08	984553	09.77	9699.08	20.74	185566	06.12
Kharif 2008	10	165199	02.39	178655	01.77	1439.83	03.08	104483	03.45
Rabi 2008 -09	11	167983	02.43	188290	01.87	2610.97	05.58	112028	03.70
Kharif 2009	14	1134355	16.42	1461149	14.49	15330.43	32.78	889296	29.34
Rabi 2009-10	10	873352	12.64	1226995	12.17	13504.9	28.88	459163	15.15
Kharif 2010	16	3896192	56.40	5991786	59.43	3659.38	07.82	1244944	41.08
Total		6908038	100.00	10081503	100.00	46768.71	100.00	3030755	100.00

Source: Agricultural Insurance Company of India Limited, Regional office, Chennai

Under the scheme, so far, about 69 lakh farmers were covered and approximately 1 crore hectares of land had been covered. The quantum jump in the expansion of coverage has come in the latest kharif 2010 season which saw about 38 lakh farmers being insured, a jump of almost 346 per cent from the previous year. Kharif 2010 season alone accounted for 41 per cent of total number of benefitted farmers.

Table 1.2: Season-wise Farmers Covered and Benefited, Area Covered and Claims Settled under Pilot Weather Based Crop Insurance Scheme in Tamil Nadu

States / Season	Farmers Covered	Percentage to Total	Area covered (Ha)	Percentage to Total	Claims Settled (Rs. in Lakh)	Percentage to Total	Farmers Benefitted	Percentage to total
Kharif 2008	8217	18.11	7141	18.02	83.1	34.95	5573	40.55
Rabi 2008-09	12727	28.05	10733	27.09	39.05	16.42	4980	36.24
Kharif 2009	9389	20.69	8606	21.72	90.56	38.09	2433	17.70
Rabi 2009-10	6699	14.76	6109	15.42	25.04	10.53	757	5.51
Kharif 2010	8344	18.39	7033	17.75	**	0.00	**	0.00
Total	45376	100.00	39622	100.00	237.75	100.00	13743	100.00

**: Claims are under process

Source: Agricultural Insurance Company of India Limited, Regional office, Chennai

The weather based crop insurance scheme in Tamil Nadu had been implemented from kharif season of year 2008. In the year of implementation, it extended relief to the farmers to the tune of Rs. 83 lakhs which increased to Rs.130 lakhs in the following year. From the Table 1.2, it can be inferred that the percentage of benefited farmers was in decreasing trend. At the beginning of the scheme, i.e., kharif 2008, 40.55 per cent of total numbers of farmers insured up to Kharif 2010 were benefitted. This number was gradually decreasing and at the Rabi 2009-10, it accounted for 5.51 per cent. However, in case of farmers covered and area covered by scheme were almost constant. In Kharif 2008, 8217 number of farmers were covered by the scheme. This number had increased to 12727 in Rabi 2008-09, which contributed 28 per cent to total covered farmers, but during Kharif 2010, 8344 farmers were included in this scheme. During 2009-10, farmers covered under WBCIS in Tamil Nadu accounted for 0.32 per cent of the total number of farmers insured in India during the same period.

1.5 Problem Focus

In Tamil Nadu, Pilot Weather Based Crop Insurance Scheme is in operation in Ariyalur, Dharmapuri, Perambalur, Salem and Virudhunagar districts by Agricultural Insurance Company of India Limited. The major issues and constraints associated with weather index products were high basis risk and very complex claim structure which are highly technical and complicated (Nair 2010). The income of the farm households from semi-arid tropics engaged predominantly in rain-fed farming was positively associated with the level of risk. Hence, the availability of formal instrument for diffusion of risk like crop insurance will facilitate farmers to adopt risky but remunerative technology and farm activities, resulting in increased income (Bhende 2005).

The coverage of farmers under WBCIS in Tamil Nadu when compared to that of all India level was quite insignificant. Therefore, for any programme, periodical appraisal is a must to find out the merits and demerits of the same. The coverage of Weather Based Crop Insurance Scheme in Salem district was significant in terms of coverage of area, number of farmers and number of crops. Hence the study proposed was to be carried out in Salem district of Tamil Nadu purposively. In Salem district, the amount of indemnity paid under the scheme was more for crops like paddy and groundnut when compared with other districts. In other districts, the amount of indemnity paid was limited up to one or two crops only. Weather Based Crop Insurance Scheme is being operated in Salem for the past two years on pilot basis and therefore, it is necessary to have a mid-term appraisal of the scheme to identify the constraints and to suggest measures to overcome them in order to achieve the goals of the scheme in full. Hence this study was planned.

1.6 Hypothesis

A thorough review of past literature has led to the construction of following hypothesis:

(i) Weather Based Crop Insurance Scheme has helped the farmers in adapting the improved farm management practices so as to realize higher yield.

(ii) Weather Based Crop Insurance Scheme has compensated the financial loss occurred due to the uncontrollable natural factors.

1.7 Objectives

The overall objective of the study was to assess the impact of Weather Based Crop Insurance Scheme in Salem district in terms of coverage of financial loss due to adverse weather parameters and generation of increased farm income.

Specific objective of the study were :

i. to assess the performance of the Weather Based Crop Insurance Scheme in Salem district of Tamil Nadu ;

ii. to estimate the extent of crop loss suffered by the sample farmers due to adverse weather parameters and the actual risk covered by the insurer with respect to the sample farms ;

iii. to assess the impact of insurance scheme on farm income levels in the sample farms; and

iv. to study the problems faced by the farmers and suggest solutions for further refinement of the scheme.

1.8 Scope of the Present Study

The finding of the present study would be useful to the Agricultural Insurance Company of India Ltd., and the Government of Tamil Nadu to formulate suitable strategies for strengthening operational aspects of the Weather Based Crop Insurance Scheme and this would result in larger coverage of the scheme to benefit those vulnerable farmers who frequently face adverse climatic conditions.

1.9 Limitation of the Study

The study was confined to Salem district of Tamil Nadu, where the production environment and cropping pattern are unique. Since the data collected were primary in nature, the information collected should have recall bias to some extent and the error owing to such recall bias was minimized to the extent possible. As the study was conducted in Salem district with limited sample size, the findings of this study cannot be generalized except to the areas with similar agro-climatic features and socio-economic conditions of the farmers.

1.10 Organization of the Thesis

Chapter I - **Introduction**: The importance of the topic, problem focus, objectives, scope and limitations of the study are presented.

Chapter II - **Concepts and Review**: A brief review on the definition of concepts, economic models and results of the related studies are presented.

Chapter III - **Design of the Study**: This chapter explains the sampling design, data collection methods and tools of analysis used in the study.

Chapter IV - **Description of the Study Area**: A brief account of the agro-climatic conditions, land use, infra structural facilities and other information relevant to the present study area is given.

Chapter V - **Results and Discussion**: A detailed discussion on the results of the study to draw specific inferences is made.

Chapter VI - **Summary and Conclusion**: A brief summary of work done and the salient findings are presented and inferences drawn and their implications for policy are also presented in this chapter.

CHAPTER II

CONCEPTS AND REVIEW

A review of concepts used in earlier related studies helps the researcher to adopt, modify and improve the conceptual framework and provides a link with the past approaches. The conceptual clarity helps in identifying the objects and phenomenon for the present study and in making inferences and comparisons with other studies. Therefore, an attempt was made to review the various related earlier studies and based on the review, the concepts used in the present study and the results of past related studies are presented under the following major sections:

2.1 Review of Concepts

1. Crop insurance
2. Concepts relating to weather insurance
3. Agricultural credit
4. Cost and returns
5. Farm Income
6. Production function
7. Crop loss
8. Garrett's Ranking Technique

2.2 Review of the Results of the Past Studies

1. Weather insurance
2. Cost and Returns
3. Production function
4. Constraints in adopting the insurance scheme

2.1 Review of Concepts

2.1.1 Crop Insurance

Crop insurance provides protection against loss or damage to growing crops including perennial crops such as tree crops against specified or multiple perils, e.g. hail, windstorm, fire, flood and so on. Measurement of loss could be by “yield” basis, production costs basis, agreed value basis or rehabilitation costs basis. While most crop insurance is geared towards loss of physical production or yield, cover may also be provided to loss of the productive asset such as tree crops.

The basic principle underlying crop insurance is that the loss incurred by a few is shared by many in an area. Also, losses incurred in bad years are compensated from resources accumulated in good years (Dandekar, 1976).

In general, the principle of crop insurance may be outlined as follows:

(1) Uncertainty faced by individual farmers is transferred to the insurer through their participation in large numbers, for which benefit, the insured farmers pay a risk premium.

(2) Total loss is shared by all the participating farmers over a wide area, i.e., horizontal spreading of risks over a wide area and vertical spreading over many years.

(3) The risk premium reflects the group risk assumed by the insurer; an indemnity is liable to be paid to the individual farmer when a loss is incurred due to causes beyond his control, as long as he maintains the insurance contract valid by paying the premium without default.

Insurance is the transfer of risk between the insured and the insurer at a cost which reduces the intensity of loss that would have otherwise been suffered by the insured. Insurance not only reduces the uncertainty faced by the insured, but it evens out the burden of a loss especially, if the loss is of a large scale one.

Ashan and Kurian (1985) stated crop insurance as an important institution capable of linking the chain of diverse measures in order to secure stabilization, growth and fair distribution in agricultural industry. It is complementary on the one hand to activities such as improved provision of irrigation, drainage fertilizers, seed, land reclamation and other means of increasing agricultural productivity and (or) reducing the impact of risks and on the other hand to price and other income support measures.

Dandekar (1985) noted that the crop insurance scheme is based on the area approach and that a taluk / tehsil is taken to be the area. Indemnities payable to farmers in the area are assessed on the basis of the average yield for the area; the variations in the yield within the area are neglected. This method is however, considered unsatisfactory.

Crop insurance is recognized to be a basic instrument for maintaining stability in farm income, through promoting technology, encouraging investment, and increasing credit flow in the agricultural sector. It contributes to self-reliance and self-respect among farmers, since in cases of crop loss they can claim compensation as a matter of right (Chandrakanth and Rebello, 1980). Thus, crop insurance cushions the shock of crop loss by assuring farmers' protection against natural hazards beyond their control. The Central Government and the State Governments in India have constituted in recent years several crop insurance schemes.

Pathak (1986) argued that through crop insurance, farmers could purchase the right for compensation by paying only a small amount and that they are assured of protection against uncertainties.

2.1.2 Concepts Relating to Weather Insurance

2.1.2.1 Actuarial

Describes the calculations made by an actuary. Essentially this is a branch of statistics, dealing with the probabilities of an event occurring. Actuarial calculations, if they are to be at all accurate, require basic data over a sufficient time period to permit likelihood of future events to be predicted with a degree of certainty (Raju and Chand, 2008).

2.1.2.2 Adverse Selection and Moral Hazard

Adverse selection in insurance markets refers to the situation where insurers find it impossible or very expensive to distinguish between high-risk and low-risk insurance applicants and thus prices insurance contracts at the average premium for all individuals, which is inappropriate and non-sustainable. This results in undercharging high-risk customers and overcharging low-risk customers for identical contracts. Over time the low-risk clients drop out of the market and the insurance company is left with a very high-risk pool of clients with higher expected indemnities that negatively affects insurer's profitability (Raju and Chand, 2008).

Moral hazard refers to the situation where the granting of an insurance contract can lead to a reduction in the application of good husbandry practices or the complete altering of production practices on the part of the client, resulting in higher loss claims. These two problems affect all insurance markets but more so in agricultural ones because obtaining information on clients is more difficult and monitoring client behavior is more costly (Raju and Chand, 2008).

According to Reno (1997), the twin problems of moral hazard and adverse selection are often blamed for the lack of an active crop insurance market for fruits and vegetables. He also found that existing empirical measures of moral hazard and adverse selection in crop insurance consider lower yields by insured producers, or large deviations between expected and actual yields as evidence of their existence. And he added that the persons those who are less concerned about yield risk are willing to pay more for insurance.

According to Michael *et al.* (2006), the asymmetric information problems of adverse selection and moral hazard can cause insurance markets to fail. Adverse selection occurs when those seeking insurance know more than insurers do about their risks. Agents facing greater risks are more likely to insure at average prices, causing those facing less risk to be priced out of the market. Moral hazard refers to the effect insurance contracts may have on the insured's hidden actions. When bad outcomes are indemnified, the insured may have less incentive to prevent these outcomes from happening. Insurers, understanding agents' incentives, may be less likely to provide insurance, and the private market for insurance can break down.

2.1.2.3 Basis Risk

The area approach treats all farmers in a defined area as identical in terms of risk and loss and, therefore, paying identical premium and receiving identical claim amount. These are based on the average risk and average loss characteristics for the entire area. It was recognized that the area approach would give rise to a basis risk

Nair (2010) stated that the basis risk associated with weather could be high for rainfall and it was expected to be moderate for many of the other weather parameters. Yet, the potential for a mismatch between parametric insurance claims settlement and the actual losses exists since these payouts too are not based on individual loss adjustments, but determined according to the measurement of the index. Experience with the implementation of the WBCIS has shown that there are various potential sources of basis risk under WBCIS too – the weather station being used for the contract may be too far from the insured; losses may be caused by factors other than the weather variable on which the index is based on, the management by the individual farm operator can be significantly different than the conditions that are imposed in a crop growth model, the poor design of the product resulting in its failure to establish accurate correlation between productivity levels and weather variations.

Given all the above, it is possible for the policy holder to experience a loss and yet receive no index insurance indemnity or receive indemnity despite no perceptible loss of yield, diametrically revealed by quadrants II and III, respectively in Table 2.1. Alternatively, a perfectly correlated index along with low basis risk would result in a situation shown by quadrants I and IV.

Table 2.1 Basis Risk Associated with Weather Insurance

		Nature of Season and Crop Yields	
		Favorable Weather	**Adverse Weather**
Quantum of Payouts	Low Claims	Low/nil claims during good season, i.e., high crop yield (I)	Low/nil claims during season of low crop yield (II)
	High Claims	High claims during good season, i.e., high crop yield (III)	High claims during season of low crop yield (IV)

Presently, weather data is often recorded at the taluka/district level through Rain Gauge Stations (RGSs) which provide rainfall data for lower insurance units. Given the high spatial variation in India, if RWS is located more than five to seven kms away from the farm location, the quantum and time of the weather parameter at the farm location may significantly vary from that of a RWS. Also, the capping of premium rates under the weather-based crop insurance scheme does not augur well for the usefulness of the product from the farmers' point of view since it is most likely to come at the expense of payouts.

Thus, a critical element for decreasing the basis risk associated with weather insurance would be to make necessary investments in weather stations so as to ensure accurate and tamper-proof measurements. Also, a high correlation between the index and the individual's risk is important for reducing basis risk. A continuous research on the climatic variations and suitable modifications in the product structure to adequately reflect the weather-yield relationship are also critical to reduce basis risk associated with this promising product.

2.1.2.4 Area Approach (Area-Yield Basis)

Under area approach, an agriculturally homogeneous area can be insured as one unit. This unit may comprise several blocks of land farmed by the same farmer or different farms farmed by different farmers. For loss adjustment in this approach, the actual average yield is assessed by simple survey through crop cutting or other methods, and compared with the normal (insured) yield. The average yield loss is applied to all land of all farmers within the defined area, disregarding individual differences in actual damage and crop yield.

The studies conducted by Turvey and Islam (1995) indicated that the area approach was not only inequitable but also inefficient. The empirical research covering 537 farms strongly confirmed the belief that individual crop insurance is better in terms of risk reduction, but premiums would be higher. The area approach in Canada was concluded to be inequitable, as benefits were not fairly distributed. The most benefits to be accrued would be by the farmers with yields closest to the average.

2.1.2.5 Drought

This is one of the most commonly requested perils by farmers, but it is also one of the most difficult perils to insure because of problems of its definition, isolation and measurement of effects on crop production. In contrast to most weather perils, drought is a progressive phenomenon, in terms of an accumulating soil moisture deficit for plant growth, and its impact on crop production and yields is often extremely difficult to predict, then measure and isolate from other non insured causes.

2.1.2.6 Historical Weather Data (HWD)

Trigger weather and actual premium rates are generated on the basis of historical weather data of 25 years or more, for a particular Reference Unit Area. In case, HWD for the full requisite period is not available, then, based on international standards, HWD may also be simulated for longer duration by Agricultural Insurance Company of India Limited (Chandrasekaran and Mani, 2009).

2.1.2.7 Indemnity

The amount payable by the insurer to the insured, either in the form of cash, repair, replacement or reinstatement in the event of an insured loss, which is measured by the extent of the insured's pecuniary loss, is termed the indemnity. It is set a figure equal to but not more than the actual value of the subject matter insured just before the loss, subject to the adequacy of the sum insured. For many crops, this means that an escalating indemnity is established, as the growing season progresses (Chandrasekaran and Mani, 2009).

2.1.2.8 Peril

A potential cause of loss or damage to the property is called a peril. Perils can be insured or uninsured, both are usually named on the insurance policy. It is therefore important that loss adjustment procedures enable distinction to be made between damage caused by insured and uninsured perils. This main natural perils covered in agricultural insurance include fire, flood, freeze, hail, wind, excess rain, drought, and so on (Chandrasekaran and Mani, 2009).

2.1.2.9 Premium

The monetary consideration payable by the insured to the insurers for the period (or term) of insurance granted by the policy is called premium (Chandrasekaran and Mani, 2009).

2.1.2.10 Pay out

Pay out structure is a pre defined benefit table, specific to a particular notified crop in a notified Reference Unit Area. Pay out structure defines the scale of pay out for a given Trigger Weather (i.e., minimum amount of rainfall below which pay-out starts) and Exit (rainfall at which full payout is given). Pay-out structures may also incorporate benefit table for each "crop stage".

2.1.2.11 Reference Unit Area

A geographical area around a Reference Weather Station, which is deemed to be reflective of the reference weather station's weather data is referred to as Reference Unit Area (RUA). To the extent practicable, such Reference Unit Areas (RUAs) will be restricted to 25 km. radius around the Reference Weather Station in case of rainfall and wind parameters like temperature, relative humidity, solar radiation, etc (Chandrasekaran and Mani, 2009).

2.1.2.12 Reference Weather Station (RWS)

An Automatic Weather Station or other designated weather station operating for a particular Reference Unit Area (RUA) for generating the weather data during the current seasons based on which the payouts are processed is called Reference Weather Station (Chandrasekaran and Mani, 2009).

2.1.2.13 Trigger Weather

It is a predefined and notified with reference to a particular weather parameter, Reference Unit Area (RUA) and notified crop and has been fixed keeping in mind the broad moisture or water or other weather parameter requirement of a particular crop. A claim trigger is defined in the policy, which is basically a threshold deficiency percentage of the weighted actual rainfall index as compared to the weighted normal rainfall index. The deficiency greater than or equal to the weighted normal rainfall index or the claim trigger will result in claim as per benefit table (Chandrasekaran and Mani, 2009).

2.1.2.14 Weather Insurance

Weather insurance is a mechanism, which protects the cultivators against anticipated shortfall in crop yield arising out of adverse weather incidence within a specific location and period.

According to Skees *et al*. (2001), a drought insurance program based on rainfall contracts could have potentially significant benefits over the current scheme. For example, using an objective trigger event should minimize moral hazard and adverse selection risk and promote a more rapid, streamlined pay-out process, in addition to increasing the potential interest of international re-insurers and capital markets in investing in the program. Based on analysis of rainfall and cereal yield data across the country, this study has determined that a rainfall index-based insurance product could be feasible in Morocco. The statistical correlation between rainfall and cereal revenue appears to be sufficiently strong in the 17 provinces in the favorable, defavorable and intermediary climatic zones to support such a product. Using data from a 21 year period, the trigger or strike rainfall level was determined for each of the 17 provinces for both a 10 per cent premium contract and a five per cent premium contract. These proportional contracts would pay the insured an amount based on the shortfall of actual rainfall during a determined period compared to the trigger rainfall, and the contracts could be purchased in any amount, allowing farmers to insure the full amount of their expected revenue.

Gaurav (2008) suggested that given the complexity and the multitude of the issues and challenges in managing weather risks in Indian agriculture, and given the critical co-movement between weather parameters and agricultural outcomes, the existing “wide gaps” need to be bridged. With a better understanding of the landscape of risk management in agriculture, and the challenges that constrain the sector, innovative frameworks to harness the rapidly growing weather markets should be developed by factoring in the socio-economic realities. Proactive stakeholder interaction and sustainable policy choices should induce scaling up of the successful innovations.

2.1.3 Agricultural Credit

In view of the vicious circle of poverty and low capital formation in agriculture, the farmers must borrow to meet their production and consumption needs (Jain and Sarawgi, 1981).

Manmohan (1981) defined agricultural credit as the pivot around which the subsistence economy of small farmers of India sustains and grows. Credit accelerates the process of farm development.

Ogunbamum (1983) defined agricultural credit as encompassing all loans and advances granted to borrowers to finance production service activities relating to agriculture, fisheries, marketing, storage and distribution of production resulting from these activities. Credit availability is thus one of the pre-requisites for enhancing agricultural productivity.

Muniraj (1987) indicated that the period of crop production loan is determined with reference to the duration of crops. The crops may be classified into three groups viz., annuals, biennials and perennials.

Resome (1987) defined agricultural credit as the amount either in cash or in kind or both forms, received from external sources, i.e., institution and non-institutional, to be repaid in the specified period of time to the lender with some interest for the use of the funds by the borrower.

Desai (1988) estimated the institutional credit requirements for agricultural production for the year 2000. He has also previously estimated the credit requirements for the period from 1990 and 1995 for the whole agricultural system including various agricultural subsystems like agri-production sub-system, agri-supply sub-system (Input distribution, agri-processing sub-system and agri-distribution sub-system) agricultural marketing, storage, and transportation. The magnitude of the scaled down credit requirements for crop production for the years 1990, 1995 and 2000 revealed that the credit delivery system has to be streamlined and strengthened.

Dantwala (1989) dealt with the projections of the requirement and demand for short term credit for crop production up to the year 2000. He projected a credit requirement of Rs 47,842 crores for the year 2000. Further, he dealt with the role of credit and its limitations in poverty alleviation.

In the present study, agricultural credit has been defined as the amount borrowed by farm households from external sources of finance/ rural institutional lending agencies for cultivating annual crops with an agreement of repaying it after harvesting the crop along with agreed interest.

2.1.4 Cost and Returns

Shukla (1966) classified the costs into Cost A_1, Cost A_2, Cost B and Cost C. Cost A_1 included costs and hired expenses actually incurred. Cost A_2 covered Cost A_1 plus rent paid for leased in land. Cost B included Cost A_2 plus rental value of owned land plus interest on fixed capital minus land revenue on owned land. Cost C covered Cost B plus imputed value of family labour.

Tandon and Dhondyal (1971) defined gross return as the difference between the total money income which a farmer would receive from the sale of the produce and the total expenses incurred in producing it.

Waghmane and Mandal (1972) defined net income as either net profit or net loss to the operator of land after (both in kind and cash) making provision for the depreciation charges, land rent, interest on working capital and imputed wage on family labour from the total income of the farm.

Raju and Rao (1990) classified the cost as Cost $A_{1,}$ Cost A_2, Cost B_1, Cost B_2, Cost C_1 and Cost C_2. Cost A_1 included all actual expenses in cash and kind incurred in production while Cost A_2 comprised of Cost A_1 and rent paid for leased in land. Cost B_1 included Cost A_1 and interest on value of owned capital assets excluding land. Cost B_2 was nothing but Cost B_1 and rental value of owned land and rent paid for leased in land (net of land revenue) while cost C_1 included Cost B_1 and imputed value of family labour. Cost C_2 was Cost B_2 and imputed value of family labor.

Patel and Bhatt (1997) classified cost as Cost A, Cost A_1, Cost B and Cost C. Cost A included all paid out cost in cash expenditure. Cost A_1 consisted of Cost A plus rent paid by the tenant. Cost B included Cost A plus rental value of owned land and imputed interest on owned capital, and Cost C is the Cost B plus imputed value of family labour.

Rajur *et al.*, (2008) used cost concepts as defined by Commission for Agricultural Costs and Prices (CACP) while calculating cost and returns in production of chilies in Karnataka. Cost concepts defined by CACP are as follows:

Cost A_1 = All actual expenses in cash and kind incurred in production by the producer. The items covered in cost A_1 are costs on:

i) hired human labour

ii) hired bullock labour

iii) owned bullock labour

iv) home produced/purchased seed

v) plant protection chemicals

vi) home produced/purchased manure

vii) fertilizers

viii) depreciation on farm machinery, equipment and farm building

ix) irrigation

x) land revenue, land development tax and other taxes

xi) interest on working capital

xii) interest on crop loan

xiii) miscellaneous expenses.

Cost A_2 = Cost A_1 + Rent paid for leased-in land

Cost B_1 = Cost A_1 + Interest on value of owned capital assets (excluding land)

Cost B_2 = Cost B_1 + Rental value of owned land (net of land revenue) and rent paid for leased-in land

Cost C_1 = Cost B_1 + Imputed value of family labour

Cost C_2 = Cost B_2 + Imputed value of family labour

Cost C_{2*} = Cost C_2 was estimated by taking into account statutory or actual wage rate for human hired labour whichever was higher

Cost C_3 = Cost C_{2*} + 10 per cent of Cost C_{2*} (on account of managerial functions performed by farmers)

Directorate of Economics and Statistics, Government of India estimates the different costs as follows: Cost A_1 included the value of human labour, value of manures and fertilizers, cost of seeds, cost of plant protection chemicals, irrigation charges, land revenue and other taxes, interest on working capital; Cost A_2 included Cost A_1 plus rent paid for leased in land. Cost B_1 included Cost A_2 plus interest on owned fixed capital assets (excluding land). Cost B_2 included Cost B_1 plus rental value of owned land. Cost C_1 included Cost B_1 plus imputed value of family labour. Cost C_2 included Cost B_2 plus imputed value of family labour and Cost C_3 included Cost C_2 plus cost of management.

In the present study also, the cost concepts as used by CACP were used.

2.1.5 Farm Income

The use of farm credit coupled with the adoption of modern farm technologies ensure enhanced farm income.

Sharma (1972) defined the gross income as the income from the crops grown. The value of both main products and by-products were considered in estimating gross income. Farm income was the difference between receipts and expenses. It was what the operator received for his own labour and family labour for the year and for the use of capital invested by them.

Singh and Patel (1972) defined income as the gross value of agricultural produce plus income from other subsidiary occupations.

According to Chauhan *et al.,* (1972), gross farm income referred to the value at prevailing prices of retained as well as marketed crop output and also the income contributed by the allied activities such as dairying, rearing of cattle, sheep, goat and poultry.

Forster (1973) defined net income of the farm as the gross income less variable costs of the farm business as a whole.

Garg *et al*. (1971) has provided data on expenditure of different factors of production. They stated that the additional expenditure on labour and material inputs due to the adoption of high-yielding varieties indirectly indicated higher shares of income for these inputs.

Shukla and Misra (1974) claimed that the net income equaled the gross income minus total cost and farm business income equaled gross income minus cost A_1 in owner operated farms and cost A_2 in tenant operated farms.

Kaul and Mehta (1977) defined gross income as the value of farm produce that consisted of cash value of produce actually sold and the value of the remaining produce evaluated at the prevailing price.

Kannan (1981) revealed that gross income included on-farm income and off-farm income consisting of hiring out of family labour, bullock pair, machinery and equipment and non-farm income including income from services, trade, profession, shop keeping, etc., emanated from all the members of the family. He also described the gross income as the sum of income of the family from all sources accessible to all its members.

Veerapandian (1983) defined gross income as the sum of income received from crop (both main and by-products), livestock products, hiring of farm labour, bullock power and non-farm income.

In the present study, farm income included the income from crop and livestock enterprises, income received by the family members through off-farm and non-farm sources.

2.1.6 Production Function

The efficiency of production on the farm was studied by fitting an appropriate econometric model, which necessarily relates the input quantity and output produced.

Suryanarayana (1958) worked out a whole farm production function to estimate the returns in Telangana farms and single production function for combined holdings of all types and with separate functions for wet, dry and mixed types of farms. The gross returns were treated as a function of land-fertility, labour and capital per acre and these factors were found to be highly significant.

Ramamurthy *et al*. (1973) studied the effect of farm size on resource productivity through the Cobb-Douglas production function. They found that all the variables viz. labour, manures and fertilizers, seeds, plant protection and management, significantly influenced gross income in all the size groups of farms.

Salikram (1977) used the concept of marginal productivity of resource, which he defined as the measure of increase in total product with an addition of one unit of a particular resource above its mean level, while other resources were held constant at their respective mean levels.

Salikram and Gupta (1978) used Cobb-Douglas production function to examine the resource productivity and efficiency of resources on paddy farms. Cobb-Douglas production function was chosen to measure the resource-use efficiency of beneficiary and non –beneficiary farmers after careful examination of data pattern and scatter diagram which showed the relationship between yield of paddy and other relevant variables.

Saini (1980) stated that productivity was the output per unit of land, whereas efficiency was the surplus value of output over all cost (including imputed value of inputs contributed by family itself).

Singh (1980) defined productivity as the outflow per unit resource and an outcome of interaction of the mutually reinforcing force of agrarian structure, resource endowment and technology, the three-resource structure dimension. He used production function to predict the total productivity of the farms in India.

Ferguson (1981) defined production function as a schedule showing the maximum amount of output that could be produced from any specified set of inputs, given the existing technology or state of art.

Misra (1984) used the production function to determine the effect of irrigation on production and resource use in Mayurkashi canal irrigated area of Birbhum district of West Bengal. He concluded that co-efficient of regression for irrigation showed significance with a positive sign, thus acting as significant component of yield increase. He also found that resources like fertilizer and pesticides were positively correlated to irrigation.

Joshi and Agnihotri (1994) used regression analysis to determine the factors responsible for yields of rice and wheat on sodic soils under reclamation which showed that fertilizer application, irrigation, gypsum application and family labour were most significant factors in increasing yield of rice. The regression co-efficient of farm size indicated that farmers with large holdings took reclamation program for just augmenting their cultivated area, whereas small farmers adopted it to enhance their income per unit area.

In the present study, the Cobb-Douglas production function was used to examine the resource productivity of Insured and non-insured Farmers.

2.1.7 Crop Loss

Walker and Jodha (1986) defined crop loss as the amount of crop income which falls short of expectations.

Jorge (1987) opined that the appraisal of loss is one of the momentous aspects of insurance. Moreover, in the case of crop insurance, a rapid loss adjustment procedure is essential. Since the farmers will wish to harvest the undamaged part of the affected crop in due time, it is necessary to set up and train an adequate number of local adjustment personnel capable of responding immediately to appraise losses. Since crop insurance is characterized by a very high degree of risk, it is risky for a primary organization to bear an excessive insurance liability accepted from farmers. Therefore, the insurance carriers should be willing to spread their risk. One option is reinsurance.

Food and Agricultural Organization (1990) stated crop loss as the difference between attainable yield, in other words, technical maximum and the actual yield realized.

General Insurance Corporation (1990) has defined the crop loss as th difference between actual yield in that particular year and threshold yield which was realized for the past five years.

2.1.8 Garrett's Ranking Technique

Sivaharini (1990) used Garrett's Ranking Technique to rank the criteria regarding credit standards and collection procedures followed by fertilizer dealers towards their farmer customers. This technique was used to rank the problems faced by the dealers in selling products and to rank the different firms in the order of dealer's preference based on credit policy of different firms.

Sudalaimani (1991) adopted Garrett's Ranking Technique to rank the promotional activities on a marketing project on tissue culture cardamom plantlets and problems faced by the planters in the cultivation of cardamom.

Senthilkumar (1992) used Garrett's Ranking Technique to rank the factors influencing the purchase of mushroom by the household consumers.

In the present study, Garrett's Ranking Technique was used to rank the suggestions put forth by insured as well as non insured farmers for strengthening the operational aspects of WBCIS.

2.2 Review of Result of the Past Studies

2.2.1 Weather Insurance

Access and availability of insurance change the attitude of the farmer and induce him to take decisions which, otherwise, would not have been taken due to aversion to risk. For example, rain-fed paddy was cultivated in one of the riskiest districts, i.e., Anuradhapur district of Sri Lanka for the first time in 1962, as insurance facility was available to the farmers (Ray, 1967).

According to Chandrakanth and Rebello (1980), crop loss due to drought, excessive rains, pests, and diseases may be included in the hazards to be insured. They also remarked that if the entire crop is lost during the planting stage, the indemnity payable should cover the costs up to that stage. Another observation was that crop insurance should be made compulsory at least for all borrowers. In this case, the insurance premium must be included in the crop finance.

Rustagi (1988) focused on the phenomenon of drought, and the variety of coping strategies employed by the poor: Some of these were primarily risk-reducing in nature (e.g. income diversification, intercropping, farm fragmentation and seasonal migration), while others were coping devices designed to protect consumption once income losses have occurred (e.g. borrowing from local money lenders, drawing down food stocks, selling assets and participating in government relief programs).

A study by Horowitz and Lichtenberg (1993) found that in the US Midwest, crop insurance exerts considerable influence on maize farmers' chemical use decisions. Those purchasing insurance applied significantly more nitrogen per acre (19 per cent), spent more on pesticides (21 per cent), and treated more acreage with both herbicides and insecticides (7 per cent and 63 per cent) than those not purchasing insurance. These results would suggest that both fertilizer and pesticides may be risk-increasing inputs.

Mishra (1994) analyzed the impact of a credit-linked Comprehensive Crop Insurance Scheme (CCIS) on crop loans, especially to small farmers in Gujarat. It was observed that CCIS had a collateral effect as reflected through the increased loan amount per borrower and reduction in the proportion of non-borrowers among small farmers. The implications of credit expansion were that increased availability of credit can enhance input use and output and employment that increased share of small farmers in the total loan can have desirable effects on equity and efficiency considerations.

Morduchv (1995) summarized a range of evidence of a kind of household ‘income smoothing’; for example, Indian farmers near subsistence level spatially diversified their plots, and devoted a larger share of land to lower-yielding, traditional varieties of rice and castor. These activities reduced the variability of agricultural revenues, but at the expense of lower average income.

According to Mishra (1996), credit insurance ensured repayment of credit, which helped in maintaining the viability of formal credit institutions. The government was relieved from large expenditures incurred for writing-off agricultural loans, providing relief and distress loans etc., in the case of crop failure through a properly designed and implemented crop insurance programme

Manojkumar *et al.* (2003) found that the crop insurance scheme shall be made viable by spreading the risk horizontally by enrolling all the farmers in a locality in the scheme. The scheme should be attractive, credit-linked, and should have support facilities like a reinsurance package. A reassurance programme should be an integrated part of any insurance programme in which credit facilities are linked with the scheme. If the crop fails in a season covered in an insurance scheme, the insured farmers should be supported with credit facilities for going to the next crop season.

According to Ulrich Hess (2003) crop loan insurance and risk management scheme can help banks significantly increase their lending volumes, especially in rain fed areas. At the same time, the scheme can help bring down default rates as well as transaction costs. It could help farmers stabilize their incomes and even allow farmers access to a greater credit line thanks to enhanced collateral.

Bhende (2005) found that income of the farm households from semi-arid tropics engaged predominantly in rain-fed farming was positively associated with the level of risk. Hence, the availability of formal instrument for diffusion of risk like crop insurance will facilitate farmers to adopt risky but remunerative technology and farm activities, resulting in increased income.

Edward Crowther (2007) concluded that drought insurance was an interesting and promising financial innovation with the potential to effect widespread and significant welfare gains for farmers (and other purchasers of it) across the developed world. ‘Technical’ issues obstructing its progress, as recognized by the project designers, included the paucity of weather data in certain regions of the developing world, and ‘basis risk’. Furthermore, as was widely recognized, drought insurance was not a panacea, and was merely one tool which needed to be employed in tackling drought risks, apart from the fact that the presence of functioning markets for crops and agricultural inputs were equally important. Other potential issues identified by this study included the psychology of the insurance decision, which suggested that (unless addressed) taking-up of insurance could be less enthusiastic than expected, and the ever-present issue of inequality.

Xavier *et al.* (2007) highlighted main deviations from a benchmark model of insurance participation. Credit constraints appeared to be an impediment to purchasing insurance. Households with less land and less wealth, as well as households who directly reported being credit constrained, were less likely to participate in insurance, consistent with the extension of a ‘benchmark’ one-period model of insurance to include financial constraints.

Geyser (2008) stated that weather has always been an unpredictable phenomenon whether it is temperature, rainfall, floods, cyclones, frost or snow. With weather patterns becoming more and more unpredictable and with the abnormal conditions experienced over the last two decades, many industries are affected by weather in a significant way. In the agricultural industry, for example, businesses have long used futures contracts of agricultural commodities to hedge weather-related risks. However, today there is such a broad array of weather risks that traditional methods cannot cover them all. As a result, a more versatile financial instrument, namely weather derivatives, has emerged in recent years.

Raju and Chand (2008) found that despite various schemes launched from time to time in the country, agriculture insurance has served very limited purpose. The coverage in terms of area, number of farmers and value of agricultural output is very small, payment of indemnity based on area approach miss affected farmers outside the compensated area, and most of the schemes are not viable. Expanding the coverage of crop insurance would therefore increase government costs considerably. Unless the programme is restructured carefully to make it viable, the prospects of its future expansion to include and impact more farmers were remote. This requires renewed efforts by Government in terms of designing appropriate mechanisms and providing financial support for agricultural insurance. Providing similar help to private sector insurers would help in increasing insurance coverage and in improving viability of the insurance schemes over time. With the improved integration of rural countryside and communication network, the unit area of insurance could be brought down to a village panchayat level.

Olubiyo *et al.* (2009) said that one of the underlying assumptions of the agricultural insurance scheme was that its introduction would encourage farmers to positively change their farming practices.

Xavier *et al.* (2009) found that risk pooling and diversification is a key function of financial markets and the financial system.

Singh (2010) discussed the dependence of Indian agriculture on uncertain rains. In addition, the farmers experienced other production risks as well as marketing risks related to different crop enterprises and for different agro-climatic regions and areas. He then argued on the need for crop insurance as an alternative to manage production risk.

Nair (2010) stated that enormous dependency of crop production on weather highlights the pressing need for an effective mechanism to cope with weather-related production risks faced by farmers. The author focused on the recent developments in the weather insurance market and evaluated the performance of the Weather-Based Crop Insurance Scheme in India. Through a micro-analysis of indemnity payouts under the traditional and the weather insurance schemes, the study revealed the much larger spread of benefits under the latter, thus significantly reducing a prominent drawback of the decades-old area yield scheme. While the product had tremendous potential to emerge as a sustainable crop insurance model that can meet the risk management needs of the rural poor, there were critical issues that merit action to achieve the desired results. Despite the promise of this type of product, formal rainfall index insurance markets were still in their infancy. The amount of insurance written remained small, and insurance providers were experimenting with different contract designs to better meet consumer needs.

2.2.2. Costs and Returns

Dodke *et al.,* (2002) used cost concepts for measuring cost and returns in turmeric cultivation. The study observed the input-output ratio at Cost C was 1:1.20 whereas it was 1:1.77 and 1:1.29 at Cost A and Cost B respectively. Since the ratio was greater than unity, turmeric cultivation was found to be profitable.

Balappa and Hugar (2002) worked out cost and returns in production of tomato. The study revealed that farmers incurred a total cost of Rs. 59,880.80 per hectare, of which variable cost accounted for 96.46 per cent. Expenditure on human labour (29.49 per cent) and plant protection chemicals (18.81 per cent) were the major components of variable cost. The study called for concerted efforts for dissemination of the new technology for proper as well as judicious use of inputs with low cost.

Dahiya *et al.,* (2002) studied cost and returns in ber cultivation and economic feasibility of investment in ber cultivation. The study indicated that investment in ber cultivation was a profitable business from producer's point of view. It suggested the need of liberal credit facilities, adequate supply system of inputs, efficient marketing system, etc. to make ber cultivation a successful venture.

Kirve *et al.,* (2002) used cost concepts in measuring cost and returns in French bean cultivation. The study depicted that the total cost of cultivation was Rs. 15,843.96 per hectare. The manure, human labour and fertilizer were the different items of cost. The net return was Rs.14,843 per hectare and output-input ratio was 1.81 in French bean cultivation which indicated French bean cultivation as profitable.

Sundar and Kombairaju (2004) computed cost and returns in gloriosa cultivation. The author classified cost of production into two types namely establishment and maintenance costs respectively. He also apportioned total establishment cost to different crop years and included under fixed cost. The study found that the average cost of production per kg of gloriosa seed was higher in small farmers with Rs. 81.14 as compared to Rs. 75.15 in case of big farmers. The study concluded that large scale production in big farms was the reason for lesser average cost of production.

Singh *et al.,* (2006) used cost concepts in measuring cost and returns for paddy. The study found that the cost of cultivation for organic paddy over cost A_1 and cost C_3 as Rs.18,786/ha and Rs. 31,651/ha and for non-organic paddy it was Rs. 19,106/ha and 35,947/ha respectively. The yields from organic and non-organic paddy were 26.86 q/ha and 32.74 q/ha respectively. However, farmers could realize relatively higher prices for organic (Rs. 1,380/q) than that of non-organic (Rs. 1,161/q) paddy. Net returns over cost A_1 and cost C_3 from organic and non-organic paddy had been found as Rs. 20,144/ha and Rs. 7,279/ha and Rs. 21,323/ha and Rs. 4,483/ha respectively. The study found that organic paddy was more profitable than inorganic paddy cultivation.

Mahalakshimi (2009) calculated cost and return in vanilla cultivation in Coimbatore district. The benefit-cost ratio was found to be much greater even after discounting, showing a ratio of 19.89, indicating that for every one rupee of investment, a farmer will receive Rs. 20 (approx) as return. The study concluded vanilla cultivation as much profitable.

Baba *et al.,* (2010) analyzed the cost, returns and break-even point in mushroom production on different categories of farms. The study has suggested that mushroom cultivation being capital intensive, the financial assistance through institutional agencies at cheaper interest rate would be desirable.

2.2.3 Production Function

Shastri (1958) fitted linear function to describe the relationship between the hours of labour per acre, pounds of nitrogen applied per acre and yield per acre of sugarcane.

Subramaniam(1986) used linear type of production function in paddy crop for pilot crop insurance scheme in Madurantakam taluk of Chengelpattu district to compare the resource use efficiency of beneficiaries and non- beneficiaries.

Shanthi (1991) used linear multiple regression to find out the resource use efficiency of the sample farms in paddy crop before and after the implementation of Comprehensive Crop Insurance Scheme in Agastheeswaram Block of Kanya Kumari district..

Ingle *et al.,* (2009) studied resource productivity and resource use efficiency using Cobb-Douglas production function in rose production. The study revealed that regression co-efficient of nitrogen (0.018), manure (0.103) and pesticide (0.028) were highly significant at 1 per cent level while the regression co-efficients of phosphorus (0.025), potash (0.008), and irrigation (0.108) were positive and statistically significant at 5 per cent level. It was inferred that these resources were underutilized and there was scope to increase them in rose production.

Olubiyo (2009) used the sign of the parameter estimates of the dummy variable in the pooled equation as measure of the efficiency of resource use between the farm groups. The sign of the coefficient obtained in analysis is negative, thereby showing that the uninsured farmers were more efficient in the bundle of resource use than the insured farmers.

2.2.4 Constraints in Insurance Scheme

Shanthi (1991) in her study on Comprehensive Crop Insurance Scheme in Agastheeswaram block of Kanya Kumari district, Showed that important problems were treating block as a homogeneous unit for conducting experiments, taking threshold yield as normal yield , high rate of premium , delayed settlement of indemnity and random selection of fields for conducting crop cutting experiments. The suggestions given by the beneficiary – farmers for better implementation of the scheme were individual area approach, normal yield to assess crop loss and settlement of indemnity in time.

Raju and Chand (2008) suggested that the majority of the farmers wanted quick settlement of claims. Around one-fifth of the beneficiaries favored that Crop Cutting Experiments used to serve as the basis for determining indemnity should be carried out in the presence of affected farmers. Some respondents also proposed reduction in premium rate and extension in insurance cover to more crops to improve the scheme.

According to Nair (2010), the major issues and constraints associated with weather index products were high basis risk, improper and not suitable for catastrophic losses and low education level of farmers.

CHAPTER III

DESIGN OF THE STUDY

The design of the study is an important component of the research. In order to fulfill the objectives of the study, an appropriate methodology for conducting the study is inevitable. Therefore, in this chapter, the methodology adopted for the present study including the selection of study area, sampling design, the method of data collection and the different tools of analyses are discussed under the following sub headings:

1. Sampling design
2. Analytical techniques employed

3.1 Sampling Design

Purposive sampling was done to select one district among 32 districts in Tamil Nadu State. Among 32 districts, Salem district was chosen to conduct the present study based on the data provided by Agricultural Insurance Company of India. Weather Based Crop Insurance Scheme coverage in Salem District was significant in terms of coverage of area, number of farmers and number of crops which could be in Appendix 3. Hence, the study was carried out in Salem District of Tamil Nadu purposively.

The Weather Based Crop Insurance Scheme (WBCIS) is implemented through Primary Agricultural Cooperatives Societies and Agricultural Department in both kharif and rabi seasons. Since kharif season was the most severely affected by natural calamities such as drought, farmers who were raising crops during kharif 2009 were considered for the study. The Primary Agricultural Cooperatives Societies were arranged in descending order with reference to the total number of beneficiaries (insured under WBCIS) in each society during Kharif, 2009 and societies which insured more beneficiaries were selected.

From among these PACS, 60 farmers who borrowed short term credit for the year 2009-10 and obtained the benefit of crop insurance, i.e., indemnity, were selected for the study as listed in Table 3,1. These farmers hereafter are called Insured and Benefitted Farmers (IBF). Total number of beneficiaries of Weather Based Crop Insurance Scheme in Salem district was 170 farmers. This information was collected from different Primary Agricultural Cooperative Societies for the study. Of them 60 farmers were selected randomly from villages based on the basis of maximum number of indemnity payouts in those villages for paddy and groundnut which were largely covered under WBCIS.

Table 3.1. Details of Selected Blocks and Villages in Salem District

(Number of Farm Households)

S. No.	Name of the Block / PACS	Insured and Benefitted Farmers (IBF)	Insured but Not Benefitted Farmers (INBF)	Non Insured Farmers (NIF)	Total
1.	**Konganapuram Block**				
i)	Kongana puram	14	7	7	28
ii)	Velleri velli	7	4	4	15
iii)	Pakkanadu	4	2	2	8
iv)	Kasthuripatti	5	2	2	9
2.	**Taramangalam Block**				
i)	Taramangalam	8	4	4	16
3.	**Mecheri Block**				
i)	Mecheri	16	8	8	32
ii)	Semmanur	6	3	3	12
	Total	**60**	**30**	**30**	**120**

However, there were many insured farmers who did not claim any indemnity during the reference period owing to several reasons. The spread of success of insurance scheme would greatly get influenced by the genuiness or the valid reasons put forth by such insured farmers. Non-insured farmers have quoted several reasons for not insuring their crops, such as claim was not settled in spite of occurrence of crop loss, delayed settlement of indemnity, high rate of premium and so on. Many borrowers of crop loan showed distrust or disinterest towards crop insurance for above reasons. Such farmers would find an excuse and justify for not insuring their crop, if they came to know that insured farmers suffered crop loss due to natural calamity but did not get indemnity. So, it would be more useful to know the reasons for not obtaining the indemnity by those farmers who were really affected by adverse weather parameters, therefore it was decided to select randomly 30 insured farmers (covered under WBCIS 2009-10) who did not obtain indemnity. Hereafter, they are called Insured but Not Benefitted Farmers, (INBF).

Apart from these two categories of insured farmers, viz., IBF and INBF, 30 Non Insured farmers (who were not covered under WBCIS during 2009-10) were also selected randomly from the villages where IBF and INBF were selected to know the reasons for not insuring their crops under WBCIS and also to assess the impact of WBCIS in terms of increased farm income level. They are referred to as Non Insured Farmers (NIF).

3.1.1 Data Collection

Primary data from the sample farms were collected with the help of a pre-tested interview schedule through personal interview. The information regarding the basic details of the sample farmer, resource availability, land use, crop enterprise taken up and levels and cost of different inputs used for crops and live stock enterprises were collected. Also, information on farmer's borrowings, amount of premium and indemnity, knowledge about the weather insurance scheme were collected.

Secondary data like location of the district, soil type, rainfall pattern, cropping pattern, demographic pattern, land use pattern, irrigation pattern, financial institutions and infrastructure facilities available, etc. were obtained from the office of the Assistant Director of Statistics, Salem district. The data on yield and seasonal conditions were obtained from agricultural department and loan and beneficiary details relevant to Salem district were collected from Agricultural Insurance Company of India Limited functioning in Chennai and District Central Co-operative Bank functioning in Salem.

3.1.2 Period of Study

The reference period for the study was the agricultural year of 2009 - 2010 and the collection of data from the sample respondents was taken up during the months from January-February, 2011

3.2 Analytical Techniques Employed

The choice of the statistical and econometric tools was decided with reference to the objectives of the study and the nature of data collected. The collected data were analyzed and tabulated to arrive at meaningful conclusions.

3.2.1 Percentage Analysis

Simple averages and percentages were worked out for important economic variables of different categories of farms in order to evaluate their general characteristics, cultivation practices, cost of cultivation and returns from farming activities, besides identifying the benefits and problems. It was also used to find out the crop loss, loss restorability and so on.

3.2.2 Crop Loss Index

Shanthi (1991) on her study on Comprehensive Crop Insurance Scheme in Kannya Kumari district used crop loss index to assess the crop loss as the difference between the actual yield in that particular year and normal yield realized for past five years and found that though crop loss was high in some areas, the financial support received was low since the indemnity was linked to the amount of loan received as well as the procedure of conducting crop experiment.

Crop loss assessment was made by using the following method,

$$\textbf{Crop loss} = \frac{\textbf{Normal yield (N)} - \textbf{Actual yield (A)}}{\textbf{Normal yield (N)}} \times 100$$

Where, N- refers to the average yield in kg/ha for the past 5 years as provided by Department of Agriculture

A- refers to the actual yield in kg/ha realized by the sample farmers

Crop loss restorability (CLR) was assessed by using the following method.

$$\textbf{CLR} = \frac{\textbf{Indemnity paid (in Rs.)}}{\textbf{Loss in rupees}} \times 100$$

3.2.3 Tabular Analysis

3.2.2.1 Cost of Cultivation

The technique of tabular presentation was used to assess the cost, returns and profits of crops in the study area. The percentages and averages of variable costs and fixed costs were computed based on the methodology followed by the Commission on Agricultural Costs and Prices, Ministry of Agriculture and Co-operation, New Delhi. The cost concepts like Cost A, Cost-B and Cost-C as listed below were used for the study.

Cost-A_1: It included the value of hired human labour, value of bullock labour (owned and hired), machine power (owned and hired), value of seeds (farm produced / purchased), value of manures (owned / purchased), value of fertilizers, value of plant protection chemicals, irrigation charges, interest on working capital, depreciation of implements and farm buildings, payments (land revenue, cesses and other taxes) and miscellaneous expenses (electricity charges).

Cost - A_2 = Cost A_1 + rent paid for leased in land

Cost - B_1 = Cost A_2 + interest on owned fixed capital (excluding land)

Cost - B_2 = Cost B_1 + imputed rental value of owned land

Cost - C_1 = Cost B_1 + imputed value of family labour

Cost - C_2 = Cost B_2 + imputed value of family labour

Cost – C_3 = Cost C_2 X 1.10 (10 % of cost C_2 added to Cost C_2)

Cost C_3 is the recently added concept to provide allowance for managerial functions undertaken by the farmers.

Cost of Production = (Cost C_3 - Value of By-Product) / Quantity of main product produced

Gross return = (Quantity of main product x price of the main product (Rs)) + (Quantity of by product x price of the by product (Rs))

Net return = Gross return - Cost C_3

3.2.2.1.1 Measurement of Variables

The variables used in the analysis were measured as given below in Table 3.2.

Table 3.2 Variables Included in Cost Concept and Measurement

Variables	Measurement
Seeds	The cost of the seed was calculated at the local market price for the farm produced seeds and actual expenditure incurred in the case of purchased seeds.
Human Labour	Human labour was estimated in terms of eight hours of work per day. The women labour days were converted into man days on the criterion that one woman day was equal to 0.60 man days on the basis of market wage rate equivalent and one child labour was equal to 0.50 man days.
Bullock Labour	Bullock labour was estimated in terms of bullock pair days. Both owned and hired bullock labours were charged at the prevailing market rate paid per day of 8 hours in the study area.
Machine Power	The cost of machine power both owned and hired was calculated at the different rates for the different type of operations prevailed in the study area.
Farm Yard Manure (FYM)	The quantity of FYM used in the cultivation of crops was measured in terms of tractor load. The cost was imputed at the market price in the village including cost of transportation and other incidental charges.
Fertilizers and Plant Protection Chemicals	Cost of fertilizers and plant protection chemicals were based on the actual prices paid by the sample farmers including the cost of transportation and other incidental charges.
Irrigation Charge	Total wages paid to farm laborers and charges for irrigating the crop during entire crop period was considered.
Land Revenue and Cess	Land revenue and cess charges were the existing charges levied by the government (Rs 50/ha for own source of irrigation, Rs 312.5/ha for food crops and Rs 625/ha for commercial crops, if public source of irrigation was used).
Rental Value of Land	It was imputed by taking the local average rental value at the rate of Rs 8,250/ha during the period of 2009-2010.
Interest on Working Capital	Interest on working capital was calculated at the rate at which banks were advancing short-term loans. The prime lending rate during the agriculture year was 7.00 per cent for crop loan. It was charged for a period of

Variables	Measurement
	duration of a particular crop.

Variables	Measurement
Interest on Fixed Capital	Interest charges on fixed capital were calculated at the rate of 11 per cent per annum as it was the rate of interest charged on long-term loans by commercial banks. This interest was worked out on the values of fixed assets, after deducting depreciation for the year. It was apportioned on the basis of the area of land under each crop grown by the farmer during the study period.
Depreciation	Depreciation was calculated by the straight line method. The charges on account of minor repairs of implements and machinery during the year were added to the depreciation charges. It was apportioned on the basis of area of land under each crop grown during the year.
Total Cost of Cultivation	Cost of cultivation included variable and fixed costs. Variable costs included the cost of human labour, bullock labour, machine power, seeds, farm yard manure, plant protection chemicals, irrigation charge and interest on working capital. Fixed costs comprised of depreciation, land revenue, rental value of land and interest on fixed capital.
Gross return	Gross return was computed by multiplying the quantity of main product and by-products obtained with their respective prices received.

3.2.3 Production Function

Production functions have been widely used to compare the level of resource use between groups of farms. It shows a technical relationship between input and output in a production process. It can thus give an insight into structural differences between groups of farms. The production function estimates are used to reveal significant differences that exist between insured and Non-insured farmers in terms of the nature of resource use, production and income. Cobb-Douglas function could be chosen as the basis of result presentation because it enjoys a wider application in this type of study and also because of the added information implied by its parameter estimates. The function is thus used to examine production performance and resource productivity between insured and non-insured farmers.

The Cobb-Douglas function, generally can be implicitly presented as

$$\mathbf{Q = AX^{b}X^{(1-b)}}$$

where A is a positive constant term and b a positive fraction.

Q and X are the variables, the relationship between which are examined by the equation. However, in order to specify the equation, the above implicit equation must be explicitly expressed by taking the log transformation of both sides as shown below:

$$\ln Q = \ln\beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + u$$

Q, the dependent variable is the value of the farm output generated per ha

X_1=> value of seeds (Rs / ha)

X_2=> value of fertilizer (Rs / ha)

X_3=> value of the human labor employed (Rs / ha)

X_4=> expenditure on plant protection-chemicals such as herbicides and pesticides (Rs / ha)

X_5=> value of machine power (Rs / ha)

β_0 => regression constant

β_1 -- β_5 are the parameters (coefficients) to be estimated, that respectively measured the relationship between the inputs and output in the production process, for the six inputs mentioned above.

u is the error term which is assumed to be normally distributed with mean zero and constant variance. In this equation, the natural logarithm of the respective variables were included.

3.2.4 Expected Signs of the Variables' Coefficients

3.2.4.1 Value of Seeds (X_1)

As the value of seeds increased, the usage of HYV and insect - pest resistance varieties will be increased, which finally would lead to the higher farm income. A positive sign was expected for the coefficient of this variable.

3.2.4.2 Value of Fertilizer (X_2)

As the cost incurred by farmer on manure and fertilizer increased, farm will be in optimum fertilizer utilisation stage and the crop yield could be increased. A positive sign was expected for the coefficient of this variable.

3.2.4.3 Value of the Human Labor Employed (X_3)

As a number of human labour in farm activities increased there will be an increase in farm yield. A positive sign was expected for the coefficient of this variable.

3.2.4.4 Expenditure on Plant Protection-Chemicals such as Herbicides and Pesticides (X_4)

As a use of plant protection chemicals increased, crop loss due to insect pest and weeds will be decreased and the farm will harness the good yield. A positive sign was expected for the coefficient of this variable.

3.2.4 Garrett's Ranking Technique

Suggestions of Insured as well as Non Insured farmers for strengthening of operational aspects of Weather Based Crop Insurance Scheme were ranked using Garrett's Ranking Technique.

Garrett's Ranking Technique was applied to rank a set of items or factors as perceived by the sample respondents based on certain criteria. The orders of merit assigned by the respondents have been converted into score using the following formula.

$$\textbf{Per cent position} = \frac{100\,(R_{ij} - 0.5)}{N_j}$$

Where R_{ij} = the rank of the i'th item by j th individual and

N_j = the number of items ranked by the j th individual.

By referring the Garrett's table, the per cent position estimated was converted into score. Then, for each suggestion, the scores of various respondents were added and the mean score was calculated. The suggestion with the highest mean score was considered to be the most important suggestion for strengthening the adoption of Weather Based Crop Insurance Scheme.

CHAPTER IV

DESCRIPTION OF THE STUDY AREA

A proper perspective of the study region covering a brief description of geographical features such as location, climate, and land use pattern and agro socio-economic features such as agricultural development, population and literacy is absolutely essential to have a better understanding of results of the study and in turn to draw meaningful conclusions. These are presented in the following sections:

4.1 Location

Salem district lies between 11^0 14" and 12^0 53" North Latitude and between $74^0$44" and 78^0 50" East Longitude. The total geographical area of the district is 5205 sq.kms. It is bounded on the north by Dharmapuri district, on the east by Villupuram district, on the south by Namakkal district and on the west by Erode district. The district may be described as Geologist's paradise, as it is surrounded by hills and the landscape dotted with hillocks and the district also is endowed with the presence of rich mineral ores.

4.2 Revenue Divisions

The district has nine taluks, namely Salem, Attur, Sankari, Mettur, Edappadi, Omalur, Gangavalli, Valapady and Yercaud and has totally 20 blocks distributed among these nine taluks. The district comprises of 33 town panchayats and 385 village panchayats which included 631 revenue villages.

4.3 Climate

The temperature in Salem district ranges from maximum of 33.74^0 centigrade to minimum of 23.03^0 centigrade. It could be seen from the Table 4.1 that the April month received the highest temperature (37.4^0 centigrade) and the December month received the lowest temperature (30^0 centigrade).

Table 4.1 Average Temperature in Salem District during the period of 2008-09

(Centigrade)

Month	Maximum	Minimum
Jan	30.80	19.20
Feb	34.60	19.90
March	35.80	23.00
April	37.40	25.20
May	36.60	25.40
June	34.30	24.60
July	34.00	24.10
Aug	33.70	24.90
Sep	33.00	23.80
Oct	34.00	23.00
Nov	30.70	22.30
Dec	30.00	21.00
Average	33.74	23.03

Source: Statistical Hand Book 2008-2009, Salem district.

4.4 Rainfall

The seasonal rainfall pattern as given in Table 4.2 showed that the average annual rainfall in the district was 976 mm (Table 4.2). Salem district received the highest amount of rainfall (396.2 mm) during the North East monsoon accounting for 40.60 per cent of the annual rainfall. The South West Monsoon supplied 352.75 mm of average rainfall, which accounted for 36.5 per cent of the total rainfall. The district received very less rainfall during winter and summer seasons.

Table 4.2 Season wise Rainfall Details of Salem District during the Period of 2002-09

(mm)

Year	Winter (Jan-Feb)	Summer (March-May)	South West Monsoon (June-Sep)	North East Monsoon (Oct-Dec)	Total
2002	04.40	143.00	255.40	220.90	623.70
2003	01.80	172.10	410.70	368.40	953.00
2004	01.30	388.00	283.30	305.90	978.50
2005	05.90	255.10	408.70	665.00	1334.70
2006	04.00	148.90	363.12	372.06	888.08
2007	01.10	222.80	274.80	394.00	892.70
2008	02.80	220.30	433.30	420.10	1076.50
2009	50.00	240.30	392.40	425.00	1062.70
Mean	03.29 (0.33)	223.81 (22.92)	352.72 (36.15)	396.42 (40.60)	976.24 (100.00)
Standard Deviation	11.45	78.41	70.74	127.55	201.99
Coefficient of Variation (%)	348.41	35.03	20.05	32.17	20.63

Figures in the parentheses indicate percentage to total.

Source: Statistical handbook 2008-2009, Salem district.

4.5 Demographic Pattern

As per 2001 census, the population of Salem district was 3,016,346 comprising of 1,563,633 males and 1,452,713 females. Of the total population, about 1,626,162 people (53.91 per cent) were living in rural areas and about 1,390,184 people (46.09 per cent) were living in urban areas. Density of population in Salem district was 573 persons per sq. Salem had an average literacy rate of 42 per cent which was, lower than the national average of 59.50 per cent.

Table 4.3 Demographic Pattern of Salem District (As per 2001 Census)

(in Numbers)

S.No.	Particulars	Salem District
1	Area (sq.km)	5205.00
3	Population	3016346
	a) Male	1563633 (51.84)
	b) Female	1452713 (48.16)
4	Rural Population	1626162 (53.91)
5	Urban Population	1390184 (46.09)
6	Density / sq.km	573

Figures in the parentheses indicate percentage to total population.

Source: Statistical Hand Book, 2008-2009, Salem District.

4.6 Occupational Status

The working population determines the magnitude of all economic activities. Hence, the different categories of workers in the study area are furnished in Table 4.4. Out of total working population of 14, 54,645 in Salem district, 65 per cent were male workers. Rural workers were predominant in the district which constituted about 61 per cent. Among the total working population 21 per cent were cultivators and 27 per cent were agricultural laborers. Around 52 per cent of total population was Non- workers.

Table 4.4 The Occupational Pattern of Salem District (As per 2001 census)

S. No	Particulars	Population (Number)	Percentage
1	Male Workers	942939	64.82
2	Female Workers	511706	35.18
	Total workers	**1454645**	**100.00**
3	Rural Workers	883025	60.70
4	Urban Workers	571620	39.30
	Total workers	**1454645**	**100.00**
5	Cultivators	301238	20.71
6	Agrl. Labours	387901	26.67
7	Household Industry	134261	9.23
8	Other Workers	631245	43.40
	Total Workers	**1454645**	**100.00**
9	Total Workers	1454645	48.23
10	Non – Workers	1561701	51.77
	Total Population	**3016346**	**100.00**

Figures in the parentheses indicated percentage to total.

Source: Statistical handbook 2008-2009, Salem district.

4.7. Size of Land Holdings

The number of holdings under different farm sizes and distribution of land holdings in Salem district are given in Table 4.5. It could be seen from the table 4.6 that the district had 309674 land holdings during 2008-09. In district the marginal holdings (below one ha) occupied a higher proportion and it accounted for 73 per cent.

Table 4.5 Size of Land Holdings in Salem District during the Period of 2008-2009

(in numbers)

Size of holding (ha)	**Type**	**Salem district**
Below one hectare	Marginal	225504 (72.81)
1.1-2.0	Small	55075 (17.78)
2.1-4.0	Semi-medium	26690 (8.61)
4.1-10.0	Medium	2039 (0.65)
Above 10 hectare	Large	366 (0.11)
Total		309674 (100.00)

Figures in the parentheses indicate percentage to total.

Source: Statistical handbook 2008-2009, Salem district.

4.8. Soils

The major soil types found in the district are red sandy soil, red loam and black soil which accounted for 41.83, 17.47 and 6.77 per cent, respectively of the total area under different types of soil in the district.

4.9. Land Use Pattern

The land utilization pattern gives an idea of the land allocation among various activities in a particular location. From this, one can easily calculate the economic status of the area. The following Table 4.6 gives the land utilization pattern of the Salem district.

Table 4.6: Land Utilization of Salem District during the Period of 2008-2009

(in Ha)

S.No.	Particulars	Salem district	Percentage
1.	Forests	125681	24.15
2.	Barren and Uncultivable land	38894	07.47
3.	Land put to non agricultural use	59210	11.37
4..	Cultivable waste	5085	00.98
5.	Permanent pasture and other grazing lands	4199	00.81
6.	Land under Miscellaneous Tree crops and groves (not included in Net Area Sown)	3192	00.61
7.	Current fallow	53236	10.23
8.	Other Fallow lands	20468	03.93
9.	Net area sown	210561	40.45
	Total geographical area	**520530**	**100.00**
10.	Area sown more than once	48839	09.38
11.	Gross cropped area	259401	49.83
12	Cropping intensity (%)	123.19	

Source: Season and Crop Report, Tamil Nadu (2008-2009)

From the above Table 4.6, it could be seen that, the total geographical area of the district was 520530 hectares during 2008-09. Of those, 210562 hectares have been brought under cultivation as net area sown which accounted for 40.45 per cent of the total area of the district. Total cropped area was 259401 hectares *i.e.* 49.3 per cent of the total area sown in the district. Forests have accounted for 125682 hectares, *i.e.*, 24.15 per cent of the total area and this was lesser than the one-third of geographical area to be under forest as prescribed for maintaining the ecological balance. Cultivable waste has been reduced to a mere 0.98 per cent in the district. Less than 11.37 per cent of the total area was put to non-agricultural use (59210 hectares). However, 14.15 per cent was accounted for by fallow lands (73704 hectares). Trees, crops, groves, Orchards *etc.*, together have accounted for about 0.61 per cent of the total area in the district. 48839 hectares of land was sown more than once in a year and therefore, gross cropped area was 259401 hectares. Cropping intensity was 123 per cent. From the above table, it could be observed that about 15 per cent of the geographical area was under cultivable waste, other fallow and current fallow and if these lands are properly put into agricultural use, agricultural production could be enhanced.

4.10. Cropping Pattern

Major crops grown in the district were paddy, sugarcane, banana, groundnut and millets. Important crops raised during 2008-2009 are given in Table 4.7.

Table 4.7 Cropping Pattern of Salem District during the Period of 2008-2009 (in ha)

S.No.	Particulars	Salem district	Percentage
a.	Paddy	29929	11.54
b.	Cholam	13724	05.29
c.	Maize	33410	12.88
1.	Total Cereals	88703	34.20
a.	Black gram	2689	01.04
b.	Green gram	2686	01.04
c.	Cowpea	2220	00.86
2.	Total Pulses	16672	06.43
a.	Turmeric	5920	02.28
3.	Total spices	9719	03.75
a.	Ground nut	25547	09.85
4.	Total Oil seeds	44350	17.10
5.	Fibers	14035	05.41
6	Sugar crops	11464	04.42
7	Other crops	73924	28.50
8	Total Misc.Non food crops	533	00.21
	Total	259405	100.00

Source: Season and Crop Report, Tamil Nadu (2008-2009).

From Table 4.7, it could be seen that food crop accounted for 40.62 per cent of the gross cropped area in this district. Maize occupied first place among total crops cultivated accounting for 13 per cent. Paddy and ground nut, the selected crops for the present study accounted for 12 per cent and 9.9 per cent respectively. Thus, maize, paddy and ground nut were largely cultivated in the district. Among the non food crops, oil seeds occupied prime place with 17 per cent of the cropped area. The total cropped area in Salem district was 259406 hectares.

4.11. Irrigation Pattern

The following Table 4.8 shows the area irrigated by different sources in Salem district.

Table 4.8 Area Irrigated by Different sources in Salem District during Period of 2008-2009

(in ha)

S.No.	Particulars	Gross Irrigated area	Net Irrigated area	Irrigation Intensity (%)
1.	Canals	3095 (02.28)	3090 (02.94)	100.16
2.	Tanks	392 (00.29)	392 (00.37)	100.00
3.	Tube wells	10676 (07.88)	8989 (08.56)	119.00
4.	Open Wells	121273 (89.52)	92496 (88.09)	131.00
5.	Other sources	29 (00.02)	29 (00.03)	100.00
6.	Total	135465 (100.00)	104996 (100.00)	129.00

Source: Season and Crop Report, Tamil Nadu (2008-2009).

It could be seen that larger area was irrigated by open wells accounting for 88 per cent of total irrigated area followed by tube wells (9 per cent). Intensity of irrigation was higher for open wells (131 per cent) followed by tube wells which was 119 per cent. The area irrigated by tank was comparatively lesser than that of tube wells. The canals and tanks were also used in limited areas**.** The overall irrigation intensity was 129 per cent.

4.12 Agricultural Implements and Machinery

The usage of machineries and implements indicate the extent of mechanization and it also plays vital role in adoption of new technologies and income generation from farm activities. Hence, the details on number of machineries and implements in Salem district are furnished below.

From the Table 4.9, it was observed that there were 3618 tractors possessed by individuals. In the district, the number oil engine and electric pump set were 14390 and 75354 respectively.

Table 4.9 Number of Agricultural Implements and Machinery in Salem District during the Period of 2008-2009

S.NO	Particulars	Numbers	Percentage
1	Tractor	3618	3.32
2	Tiller(power)	731	0.67
3	Bullock carts	7211	6.63
4	Hand operated sprayers	3395	3.12
5	Power operated sprayers	4032	3.70
6	Oil engine	14390	13.23
7	Electric motor	75354	69.30
	Total	108731	100.00

Source: Statistical handbook 2008-2009, Salem district.

4.13. Animal Husbandry

Animal husbandry and agriculture are the twin occupations, which from time immemorial have played a significant role in improving the rural economy. Livestock rearing provides meaningful occupation, both full time and part time, provides assured income and ensures better utilization of human resources. It provides employment especially self-employment to a substantial number of rural and urban population, many of whom are women, who play a major role in the care and management of livestock. The livestock status of the Salem district is shown in Table 4.10.

Table 4.10 Status of Livestock and Poultry in Salem District during the period of 2007-2008

(in numbers)

S.No.	Name of the animals	*Salem district*	*Percentage*
1.	Cattle	550957	11.85
2.	Buffaloes	131515	02.83
3.	Sheep	453676	09.76
4.	Goat	412545	08.87
5.	Poultry	3098448	66.67
Total		4647141	100.00

Source: 18th Census Details 2007-2008, Salem district

The above Table 4.10, shows that cattle population accounted for 12 per cent of total livestock population. It could also be observed that poultry was one of the main enterprises in Salem district.

4.14. Infrastructural Facilities

4.14.1. Markets

In agriculture, marketing plays a major role in bringing the rural community into the mainstream of national economy. In the study area there were 13 regulated markets, 496 private mandies and 6 co-operative marketing societies. They dealt with paddy, pulses, maize. Commission agents played vital role in the marketing system.

4.14.2. Financial Institutions in Salem District

Table 4.11: Number of Branches of Financial Institutions in Salem District during Period of 2009-2010

(Nos)

S.No.	Bank Branches	Salem district
1.	Commercial banks	126
2.	District Central Co-operative Bank(Branches)	35
3.	Primary Agricultural Credit Societies	211
4.	Primary Land Development Banks	6
5.	Private sector banks	46
6.	Urban banks	8
Total		**432**

Source: Assistant Director of Statistics, Salem 2009-10

From the above Table 4.11, it could be inferred that both institutional and non institutional agencies were playing a vital role in providing the financial support to the farming communities. Primary Agricultural Credit Societies, District Central Co-operative Banks, Primary Land Development Banks and Commercial Banks form the institutional agencies. Co-operative Societies serve the role of extending required credit as well as the source of supply of agricultural inputs like fertilizers and pesticides to the farmers.

Primary Land Development Banks provided medium term and long term loans for the purchase of machineries, digging wells and also for the deepening of existing wells. Besides these, commercial banks were also providing credit to the farming community.

4.14.3 Credit Distribution

The sector wise credit distribution in Erode district is presented in Table 4.12.

Table 4.12 Sector wise Credit Distribution in Salem District during the Period of 2009-2010

S.No.	Sector	Allocation (Rs. Crore)	Percentage	Achievement (Rs. Crore)	Percentage
1	Agriculture and Allied Sector	871.73	61.60	816.34	67.17
2	Non-Farming Sector/SSI	197.90	13.98	106.87	8.79
3	Other Priority Sector	345.53	24.42	292.18	24.04
	Total	1415.16	100.00	1215.39	100.00
4	**Banking Development Indicator**				
a.	Deposit (Rs. in Crore)	6515			
b.	Credit (Rs. in Crore)	6826			
c.	CD ratio (per cent)	104.8			

Source: State Level Banker's Committee, Tamil Nadu. 2010

From the Table 4.12, it could be seen that the highest share of credit flow was to agricultural sector (67 per cent) followed by other priority sector (24 per cent) and non-farming/SSI(14 per cent). Thus, it could be clear from the above table that agriculture was the vital sector as far as lending was concerned. Credit deposit ratio was 105 per cent.

4.14.4 Transport and Road Facilities

The study area was well connected with roads and railways. NH7 passes through the Salem district connecting Kanniya Kumari and Bangalore. The Salem and Bangalore broad gauge railway line is passing through the district for about 45 kms.

4.14.5. Industries

Salem district was having one Salem Steel Plant Industry in Salem and another Sago serve was located with Head quarters at Salem for export of Starch and Sago. There were 1200 Coir processing and Textile units in the district. Apart from these, there were Dalmia cement industry and Sankar cement industry located in Salem district.

4.14.6. Education

Increase in literacy helps in transfer of latest technologies to enhance crop production. Hence, the details of number of educational institution are furnished in Table 4.13.

From the Table 4.13, it could be seen that the district had more number of primary schools and other schools. The district had also more number of engineering and arts and science colleges.

Table 4.13 : Educational Institutions in Salem District During the Period of 2008-09

(Numbers)

S.No.	Particulars	Salem
1	Primary School	1223
2	Middle School	279
3	High School	112
4	Higher Secondary School	132
5	I.T.I	16
6	Universities	2
7	Poly Techniques	8
8	Engineering College	8
9	Arts and Science College	14
10	Medical college	6

Source: Statistical Hand Book, Directorate of Economics and Statistics, Salem

CHAPTER V

RESULTS AND DISCUSSION

In the earlier chapters, a brief review of the past studies, relevant methodology adopted and general description of the study area were presented. With that background, the data collected during the survey were analyzed in relation to each of the specific objectives of the study and results have been tabulated. In this chapter, the results of the analyses are presented and discussed in the following sections:

i. Performance Analysis of Weather Based Crop Insurance Scheme

ii. General Characteristics of Sample Respondents

iii. Assessment of Farmers' Awareness about the Weather Based Crop Insurance Scheme

iv. Farm Resources Utilization by Sample Respondents

v. Production Function Analysis

vi. Investment Activity and Income of Sample Respondents

vii. Assessment of Crop Loss and Financial support

viii. Problems Faced by the Farmers in the Adoption of the Insurance Scheme

5.1 Performance analysis of Weather Based Crop Insurance scheme

5.1.1 State wise Performance of Weather Based Crop Insurance Scheme in India

Table 5.1 shows that among implementing states of Weather Based Crop Insurance Scheme, Rajasthan has remained the dominant state, with 60 per cent of the total number of farmers insured and accounting for almost half of the total area, liability and premium generated . In fact, the state government promoted the scheme in a major way in the initial years and the scheme had covered about 5.8 lakhs farmers contributing about Rs 92 crore of total claim settlement in rabi 2007-08 (Appendix 2) . Bihar was the second most important state, covering about 17 per cent of the total number of farmers insured. The other emerging states were Gujarat, Karnataka and Maharashtra as far as weather insurance was concerned.

Table 5.1: State-wise Farmers Covered/Benefited and Area Covered/Claims Settled under Pilot Weather Based Crop Insurance Scheme (2007-2008 to 2009-2010)

States/Season	Farmers Covered	Per cent to total	Area (Ha)	Per cent to total	Claims Settled (Rs. in Lakh)	Per cent to total	Farmers Benefitted	Per cent to total
Andhra Pradesh	131018	01.90	133698.5	01.33	1734.23	03.48	16879	00.56
Bihar	1204330	17.43	1339162	13.28	13556.88	27.24	897052	29.60
Chhattisgarh	14951	00.22	27956	00.28	100.79	00.20	4121	00.14
Gujarat	273842	03.96	189307	01.88	721.65	01.45	126651	04.18
Haryana	6420	00.09	15134	00.15	306.69	00.62	2378	00.08
Himachal Pradesh	5559	00.08	1641	00.02	441.28	00.89	4308	00.14
Jharkhand	69659	01.01	34993.09	00.35	192.81	00.39	34116	01.13
Karnataka	211582	03.06	250617.4	02.49	952.01	01.91	127219	04.20
Kerala	20153	00.29	14404.23	00.14	247.73	00.50	6484	00.21
Madhya Pradesh	113566	01.64	240527.7	02.39	1252.52	02.52	71540	02.36
Madhya Pradesh	87780	01.27	210588.7	02.09	1010.33	02.03	63673	02.10
Maharashtra	447484	06.48	570961	05.66	993.95	02.00	398803	13.16
Orissa	169452	02.45	237262	02.35	1289.72	02.59	82024	02.71
Punjab	17	00.00	95	00.00	0	00.00	0	00.00
Rajasthan	4168682	60.35	6972673	69.16	22939.56	46.09	999480	32.98
Tamil Nadu	45376	00.66	39622	00.39	237.75	00.48	13743	00.45
Uttar Pradesh	9701	00.14	4523	00.04	*	00.00	2877	00.09
Uttarakhand	1153	00.02	532	00.01	100	00.20	960	00.03
West Bengal	8797	00.13	4029.76	00.04	108.1	00.22	7139	00.24
TOTAL	6908038	100.00	10081503	100.00	46768.71	100.00	3030755	100.00

*: Claims approved and to be settled on receipt of State Governments share of premium subsidy.

Source: Agricultural Insurance Company of India Limited, Chennai

In Tamil Nadu, only 0.7 per cent of the total number of farmers covered in India had insurance coverage. In terms of area coverage (0.4 per cent), claims settled (0.5 per cent) and the farmers benefitted (0.5 per cent), Tamil Nadu's share in all India level was quite insignificant.

5.1.2 Crop- wise Coverage and Performance under Weather Based Crop Insurance Scheme in India

The crops notified under weather-based schemes are shown in Appendix 1. Table 5.2 would show that wheat was the most important crop accounting for one-third of the total number of farmers insured, acreage and premium generated. Paddy and gram amongst the food crops and cumin amongst the annual commercial and horticulture crops were the other important crops in terms of coverage. Overall, food crops and oilseeds accounted for more than 80 per cent of the coverage, insurance value and total premium generated and they also registered more than 90 per cent of the total indemnity payouts.

The crop-wise performance showed the aggregate of all the implementing states for the past four seasons. Potato and cumin have the highest per unit sum insured followed by food crops like wheat and paddy. The crop-wise coverage and indemnity would reveal that certain crops like gram, tur and potato not only had high payouts but these seemed to be highly benefitting to the insured farmers. For these crops, almost 85 to 95 per cent of the insured farmers have benefited from the payouts, with the claims even exceeding the total premium generated.

More than 50 per cent of farmers from crops like wheat, maize, potato, paddy and gram were benefited under this scheme. In terms of claim ratio only pulses and tur have been accounting for more than 100 per cent of total claims to sum insured. Per farm claims for mustard (Rs. 5135) was higher followed by potato (Rs, 4,214) and followed by all other crops. Per hectare sum insured for potato was higher (Rs. 46,500) when compared all other crops and lower for green gram (Rs. 8,000).

Table 5.2: Crop-wise Coverage under WBCIS in India (Kharif 2007 to Rabi 2008-09 Season)

S.No	Crops	Farmers Insured ('000s)	Area (000 Ha)	Sum Insured	Farmers Premium (Rs in lakhs)	Total Premium (Rs in lakhs)	Total Claims (Rs in lakhs)	Farmers Benefited (in '000 s)	Sum insured Per Ha (Rs)	Claims Per Farmer (Rs)	FB as % of FI (%)	LC (%)	Farmers' CR (%)	Total CR (%)
1	Wheat	321 (33.00)	439 (37.00)	89,995 (23.00)	1,349 (33.00)	6,844 (36.00)	5,168 (33.00)	145	20,500	3,564	45	6	383	76
2	Mustard	145 (15.00)	212 (16.00)	31,873 (13.00)	637 (11.00)	2,272 (11.00)	1592 (11.00)	31	15,000	5,135	22	5	250	70
3	Gram	164 (17.00)	340 (25.00)	49,493 (20.00)	1,003 (17.00)	3,864 (19.00)	4,825 (34.00)	106	15,000	4,552	65	10	481	125
4	Paddy	106 (11.00)	121 (9.00)	24,454 (10.00)	597 (10.00)	2,420 (12.00)	1035 (7.00)	61	20,252	1,697	58	4	173	43
5	Tur	22 (2.30)	33 (2.40)	4,008 (1.70)	100 (1.70)	503 (2.40)	508 (3.60)	19	12,000	2,674	86	13	507	101
6	Greengram	15 (1.50)	15 (1.10)	1,176 (0.50)	29 (0.50)	137 (0.70)	42 (0.30)	7	8,000	600	49	4	144	31
7	Barley	13 (1.30)	9 (0.70)	1,312 (0.50)	28 (0.50)	95 (0.50)	27 (0.20)	2	15,200	1,350	12	2	95	28
8	Groundnut	8 (0.80)	12 (0.90)	2,151 (0.90)	61 (1.00)	229 (1.10)	116 (0.80)	7	18,000	1,657	79	5	189	51
9	Maize	8 (0.80)	11 (0.80)	1,474 (0.60)	36 (0.60)	154 (0.70)	49 (0.30)	5	13,500	980	62	3	135	32
	Sub Total	802 (82.00)	1,192 (88.00)	2,05,936 (85.00)	3842 (65.00)	16,518 (80.00)	13,362 (94.00)	384 (91.00)	17,300	3,480	48	6	348	81
10	Cumin	90 (9.20)	80 (5.90)	19,680 (8.10)	1,094 (18.60)	2,089 (10.20)	134 (0.90)	22	25,000	609	24	1	12	6
11	Isabgol	52 (5.30)	60 (4.40)	9,031 (3.70)	540 (9.20)	1,080 (5.30)	45 (0.30)	0.004	15,000	1	1	0	8	4
12	Potato	17 (1.70)	11 (0.80)	5,438 (2.20)	294 (5.00)	623 (30)	590 (4.20)	14	46,500	4,214	85	11	201	95
13	Cotton	15 (1.50)	12 (0.90)	2,114 (0.90)	102 (1.70)	254 (1.20)	39 (0.30)	3	17,300	1,300	21	2	38	15

	Sub Total	173 (17.70)	163 (12.00)	36,263 (15.0)	2,029 (34.60)	4,045 (19.70)	807 (5.70)	39 (9.30)	22,300	2,069	23	2	40	20
	Grand total	975 (100.0)	1,355.5 (100.00)	2,42,199 (100.00)	5,870 (100.00)	20,563 (100.00)	14,169 (100.00)	423 (100.00)	17,900	3,350	44	6	241	69

>(FI= Farmers Insured, SI = Sum Insured, FP = Farmers Premium, TP = Total Premium, TC=Total Claims, FB = Farmers Benefited, LC=Loss Cost (Claims/Sum Insured *100),

CR = Claim Ratio (Claims/Premium * 100))

>(Figures in parentheses denote percentages to total)

Source: Agricultural Insurance Company of India Limited, Chennai

5.1.3 Season-wise Performance of Weather Based Crop Insurance Scheme Tamil Nadu

The weather based crop insurance scheme in Tamil Nadu was implemented from kharif season of year 2008. From Table 5.3, it can be inferred that the percentage of benefited farmers cover was on the decreasing trend. At the beginning of the scheme, i.e., kharif 2008, 40.55 per cent of total number of the farmers covered under WBCIS were benefitted. This number of benefitted farmers was gradually decreasing and at the Rabi 2009-10, it was only at 5.51 per cent. However, in terms of farmers covered and area covered by scheme, there was a constant trend. In Kharif 2008, 8217 number of farmers were covered by the scheme. This number had increased to 12727 in Rabi 2008-09, which contributed 28 per cent to total covered farmers, but during Kharif 2010, 8344 farmers were included in this scheme.

Table 5.3: Season-wise Farmers Covered/Benefited and Area Covered/Claims Settled under Pilot Weather Based Crop Insurance Scheme in Tamil Nadu

States/Season	Farmers Covered	Percentage	Area (Ha)	Percentage	Claims Settled (Rs. in lakh)	Percentage	Farmers Benefitted	Percentage
Kharif 2008	8217	18.11	7141	18.02	83.1	34.95	5573	40.55
Rabi 2008-09	12727	28.05	10733	27.09	39.05	16.42	4980	36.24
Kharif 2009	9389	20.69	8606	21.72	90.56	38.09	2433	17.70
Rabi 2009-10	6699	14.76	6109	15.42	25.04	10.53	757	5.51
Kharif 2010	8344	18.39	7033	17.75	**	0.00	**	0.00
Total	45376	100.00	39622	100.00	237.75	100.00	13743	100.00

****: Claims are under process**

Figures in parentheses denote percentages to total

Source: Agricultural Insurance Company of India Limited, Chennai

The trend of area covered by WBCIS was almost constant. In the starting season, 7141 hectare of land was included in scheme and Rs.83.1 lakhs were settled as claim. During the second season, i e., Rabi 2008-09, it covered a maximum area of land (10733) hectare but claim settled amount was only Rs. 39 lakhs. In kharif 2009, the claim settled amount was highest (Rs. 90.56 lakhs) but the area covered by scheme was lesser than that of previous season. During that season, 8606 hectare was under the insurance scheme. While looking at Rabi 2009-10 and

Kharif 2010, the number of farmers included by scheme were 6109 and 7033 respectively. So it could be concluded that despite of continuance of the scheme, the number of benefited farmers was decreasing. There was also a wide year-to-year fluctuations in case of number of farmers covered and settled with claims.

5.1.4 District wise Performance of Weather Based Crop Insurance Scheme in Tamil Nadu

The WBCIS in Tamil Nadu was implemented in five districts of Tamil Nadu, namely, Ariyalur, Dharmapuri, Perambalur, Salem and Virudhanagar. The details of district wise coverage of WBCIS are shown in Table 5.4. From the table, it could be concluded that Preambalur was in first place in terms of number of farmers included, area covered and sum insured and it was followed by Salem district. Salem district had highest amount of farmer's premium as well as total premium, i.e., 41 per cent and 30 per cent of total respectively. Moreover, per hectare sum insured was also the highest in Salem district which was Rs.16,778. Virudhanagar held highest position for total claim (Rs.30,85,531) , per farmer claim as well as farmers benefitted as percentage of farmers insured, Loss Cost ratio, Farmer's Claim ratio and Total Claim ratio.

In Salem district, 2308 farmers were insured under this scheme which was 24 per cent of the total number of farmers included. Farmer's claim ratio was 14 per cent and Total Claim ratio was 72.78 per cent.

5.1.5 Crop-wise Coverage and Performance of Weather Based Crop Insurance Scheme in Salem District

The Table 5.5 would show the crop-wise coverage under WBCIS in Salem district during Kharif season of year 2009. From the table, it could be inferred that out of 13 crops included banana was the major crop included in the insurance scheme. Number of farmers insured, area covered by insurance, sum insured, total premium, total claim as well as number of benefited farmers were highest for banana. Paddy II and Groundnut were the second and third most important crops covered by the insurance scheme. Paddy II cultivated by 437 farmers and ground nut by 121 farmers in an area of 775 and 220 hectare respectively were covered under the scheme.

Table 5.4 : District -wise Coverage under Weather Based Crop Insurance Scheme Tamil Nadu (Kharif 2009)

S.NO	District Covered	Farmers Insured	Area (Ha)	Sum Insured (Rs)	Farmers Premium (Rs)	Total Premium (Rs)	Total Claims (Rs)	Farmers Benefited	Sum insured Per Ha (Rs)	Claims Per Farmer (Rs)	FB as % of FI (%)	LC (%	Farmers CR (%)	Total CR (%)
1	Ariyalur	2037 (21.70)	5939.69 (27.61)	59284900 (22.93)	1398637 (13.54)	595,597 (21.50)	3032291 (33.48)	1089 (44.76)	9,981	2,784	53.46	5.11	216.80	509
2	Dharmapuri	1880 (20.02)	2655.1 (12.34)	40238675 (15.56)	2285355 (22.12)	459,692 (16.59)	1346824 (14.87)	513 (21.09)	15,155	2,625	27.28	3.34	58.93	292
3	Perambalur	2662 (28.35)	7288.78 (33.88)	73,427,575 (28.40)	1973877 (19.11)	744,520 (26.87)	618629 (06.83)	197 (08.10)	10,074	3,140	07.40	0.84	31.34	83
4	Salem	2308 (24.58)	4322.098 (20.09)	72,516,751 (28.05)	4255877 (41.20)	834,352 (30.12)	607302 (6.71)	170 (08.22)	16,778	3,037	08.66	0.83	14.27	72.
5	Virudhunagar	495 (05.27)	1309.092 (06.08)	13065930 (5.05)	415628 (04.02)	136,323 (4.92)	3085531 (34.07)	338 (13.89)	9,981	9,129	68.28	23.61	742.38	2263
6	Total	9389 (100.00)	21514.6 (100.00)	258533831 (100.00)	10329374. (100.00)	27,70,485 (100.00)	90,55,933 (100 .00)	2433 (100.00)	12,017	3,719	24.90	3.36	84.13	313

(FI= Farmers Insured, SI = Sum Insured, FP = Farmers Premium, TP = Total Premium, TC=Total Claims, FB = Farmers Benefited, LC=Loss Cost (Claims/Sum Insured *100), CR = Claim Ratio (Claims/Premium * 100))

(Figures in parentheses denote percentages to total)

Source: Agricultural Insurance Company of India Limited, Chennai

Table 5.5 : Crop-wise Coverage under Weather Based Crop Insurance Scheme in Salem (Kharif 2009)

S.No	Crops	Farmers Insured	Area (Ha)	Sum Insured	Farmers Premium (Rs)	Total Premium (Rs)	Total Claims (Rs)	Farmers Benefited	Sum insured Per Ha (Rs)	Claims Per Farmer (Rs)	FB as % of FI (%)	LC (%)	Farmers CR (%)	Total CR (%)
1	Banana	443 (19.19)	452.76 (10.48)	18110600 (22.18)	1086636 (28.18)	2082719 (25.71)	30497 (5.6)	28 (16.5)	40000	1089	6.32	0.16	2.81	1.46
2	Cotton Irrigated	7 (0.30)	6.61 (0.15)	82625 (0.10)	4957.5 (0.13)	9501.875 (0.12)	0 (0.0)	0 (0.0)	12500	6944	0.00	0	0.00	0.00
3	Cotton Rainfed	41 (1.78)	168.32 (3.89)	10090120 (12.36)	60595.2 (1.57)	116140.8 (1.43)	138894 (25.5)	20 (11.8)	59946	0	48.78	1.37	229.22	89.95
4	Groundnut	121 (5.24)	220.34 (5.10)	2203400 (2.70)	77119 (2.00)	214831.5 (2.65)	104470 (19.2)	62 (36.5)	10000	1685	51.24	4.74	135.47	48.63
5	Maize	85 (3.68)	158.26 (3.66)	1582600 (1.94)	39565 (1.03)	154303.5 (1.90)	0 (0.0)	0 (0.0)	10000	0	0.00	0	0.00	0.00
6	Millets	21 (0.91)	24 (0.56)	120006 (0.15)	3000 (0.08)	11700 (0.14)	0 (0.0)	0 (0.0)	5000.25	0	0.00	0	0.00	0.00
7	Paddy I	75	181.47	1814700	45368	176934	0	0	10000	0	0.00	0	0.00	0.00

		(3.25)	(4.20)	(2.22)	(1.18)	(2.18)	(0.0)	(0.0)						
8	Paddy II	437 (18.93)	775.57 (17.94)	7755700 (9.50)	155114 (4.02)	756180.8 (9.33)	247403 (45.4)	45 (26.5)	10000	5497	10.30	3.18	159.50	32.72
9	Pulses	27 (1.17)	34 (0.79)	170000 (0.21)	4250 (0.11)	16576 (0.20)	0 (0.0)	0 (0.0)	5000	0	0.00	0	0.00	0.00
10	Sesame	1 (0.04)	1 (0.02)	6000 (0.01)	210 (0.01)	585 (0.01)	0 (0.0)	0 (0.0)	6000	0	0.00	0	0.00	0.00
11	Tapioca	286 (12.39)	207.18 (4.79)	8287201 (10.15)	497232 (12.89)	953028.1 (11.77)	24034 (4.4)	15 (8.8)	40000	1602	5.24	0.29	4.83	2.52
12	Tomato	11 (0.48)	14.74 (0.34)	266360 (0.33)	12381.6 (0.32)	23731.4 (0.29)	0 (0.0)	0 (0.0)	18070	0	0.00	0	0.00	0.00
13	Turmeric	753 (32.63)	2077.83 (48.07)	31167645 (38.17)	1870058 (48.49)	3584279 (44.25)	0 (0.0)	0 (0.0)	15000	0	0.00	0	0.00	0.00
	Total	2308 (100.00)	4322.09 (100.00	81656957 (100.00)	3856487 (100.00)	8100510 (100.00)	545298 (100.0)	170 (100.0)	18892	3207	7.37	0.66	14.14	6.73

Source: Agricultural Insurance Company of India Limited, Chennai

>(FI= Farmers Insured, SI = Sum Insured, FP = Farmers Premium, TP = Total Premium, TC=Total Claims, FB = Farmers Benefited, LC=Loss Cost (Claims/Sum Insured *100), CR = Claim Ratio (Claims/Premium * 100))

>(Figures in parentheses denote percentages to total)

In case of the Farmer's Claim ratio percentage, rain fed cotton, paddy II and groundnut had maximum values with 229, 159 and 135 respectively. But in case of Total Claim Ratio, rain fed cotton came first followed by groundnut and paddy II with the value of 90, 49 and 33 per cent respectively. As far as Lost Cost ratio concerned was groundnut, paddy II and rain fed cotton came in first, second and third rank with the value of 4.7, 3.1 and 1.4 per cent respectively. Per farmer claim was the highest in irrigated cotton followed by paddy II and groundnut with Rs.6944, Rs.5497and Rs.1685 respectively. The average claims settled per farmer for all the 13 crops was Rs.3207. Further, it could be inferred that total premium collected was Rs.81.01 lakhs whereas total claim given was only Rs.5.45 lakhs, that is, only 6 per cent of total premium was settled as claims. Out of 2308 farmers, only 170 farmers have been benefitted by this scheme accounting for 7.4 per cent.

5.2 General Characteristics of Sample Respondents

The sample respondents were classified into three categories, viz., Insured and Benefitted Farmers (IBF), Insured but Non Benefitted Farmers (INBF) and Non- Insured Farmers (NIF). A brief description of the general characteristics of the sample respondents would provide the necessary setting for the discussion on the findings of the study. Therefore, the general characteristics like age, educational status, family size and average size of holdings are presented and discussed in this section.

5.2.1 Age Distribution

Age of the sample farmers would be directly related to the adoption of innovative farm practices and involvement of any development programmes implemented by the government. Hence, details on age of the sample respondents are given in Table 5.6. It could be observed from Table 5.4 that average age of all the sample farmers was 48 years and in case of insured farmers, the average age was 47 years, while Non-insured farmers, the average age was 49 years respectively.

Of the total sample of 120 farmers, 43 per cent of farmers were aged between 46 and 55 years, 16 per cent of farmers were more than 55 years old, 39 per cent of farmers were between 36 and 45 years old and the remaining 1.6 per cent of farmers were below 35 years.

Table 5.6.Age Distribution of Sample Respondents

S.No	Age	Insured and Benefitted Farmers	Insured but Not Benefitted Farmers	Insured Farmers	Non Insured Farmers	Total
1	<35years	1 (01.70)	0 (0)	1 (01.11)	1 (03.30)	2 (01.60)
2	36- 45 years	25 (41.70)	14 (46.7)	39 (43.33)	9 (30.00)	48 (39.40)
3	46 - 55 years	27 (45.80)	12 (40.00)	39 (43.33)	13 (43.30)	52 (43.03)
4	>55 years	7 (11.70)	4 (13.30)	11 (12.22)	7 (23.30)	18 (16.10)
5	Total	60 (100.00)	30 (100.00)	90 (100.00)	30 (100.00)	120 (100.00)
	Average Age	47.45	47.5	47.47	49.13	48.02

Figures in parentheses indicate percentage to total.

It could be concluded that 43.40 per cent of IBF and 46.7 per cent of INBF were below 45 years old, while only 33.30 per cent of NIF belonged to that age group. Further, 87 per cent of the insured farmers were aged between 36 and 55 years whereas NIF of the similar age group constituted only 73 per cent. The results showed the dominance of middle aged group in the involvement of the insurance scheme.

5.2.2 Educational Status

Educational status would empower the farmers to take up prudent decisions on joining the insurance scheme. Hence, educational status of the heads of sample farm households is given in Table 5.7

Table 5.7 Educational Status of Sample Respondents

S.No	Literacy level	IBF	INBF	Insured Farmers	NIF	Total
1	Illiterate	14 (23.00)	6 (20.67)	20 (22.24)	10 (33.33)	30 (25.00)
2	Primary	20 (33.33)	3 (10.00)	23 (25.55)	5 (16.67)	28 (23.33)
3	Secondary	11 (18.33)	7 (23.33)	18 (20.00)	7 (23.33)	25 (20.84)
4	Higher secondary	12 (20.00)	10 (33.33)	22 (24.44)	5 (16.67)	27 (22.50)
5	Degree	3 (5.00)	4 (13.33)	7 (07.77)	3 (10.00)	10 (8.33)
	Total	60 (100.00)	30 (100.00)	90 (100.00)	30 (100.00)	120 (100.00)

Figures in parentheses indicate percentage to total

It could be observed from the Table 5.7 that among the sample farmers, the total literacy level was higher in Insured Farmers (78 per cent) when compared with that of Non-Insured Farmers (67 per cent).

It could be observed from Table.5.5. that one third of Non Insured Farmers (NIF) were illiterates where as in case of insured farmers only 22 per cent were illiterates. In case of insured farmers, 25 per cent of respondents had crossed elementary level of education while only 16 per cent of the NIF had only primary education. More than 35 per cent of insured farmers had education level of above higher secondary level while 26 per cent of the heads of NIF were educated above higher secondary level. Thus, the educational status of the sample respondents clearly showed that the level of education was higher in insured farmers, which would have helped them in accepting new schemes like Weather insurance scheme.

5.2.3 Family Size

The size of the family has an important implication with respect to income realization of the sample households and timely repayment of loan. Hence, the family sizes of sample respondents are discussed to study the comparative performances of insured and uninsured farmers. The family size groups were categorized according to the nature of data collected. The details of the family size particulars are represented in Table 5.8.

Table 5.8 Family Size of the Sample Households **(Number)**

S.No	Family size	IBF	INBF	Insured Farmers	NIF	Total
1	<5	39 (65.00)	17 (56.66)	56 (62.23)	10 (33.33)	66 (55.00)
2	5 - 6	16 (26.66)	8 (26.66)	24 (26.66)	14 (46.67)	38 (31.66)
3	>6	5 (8.33)	5 (16.66)	10 (11.11)	6 (20.00)	16 (13.33)
	Total	60 (100.00)	30 (100.00)	90 (100.00)	30 (100.00)	120 (100.00)
Average family size		4.57	4.93	4.75	5.22	4.90

Figures in parentheses indicate percentage to total

From Table 5.8, it could be inferred that 62 per cent of the households in Insured farmers belonged to less than 5 family size group followed by the family size group of 5 to 6 accounting for 27 per cent of total households in the Insured farmers and the family size group of more than 6 accounted for 11.1 per cent of the total number of insured farmers.

Among the Non Insured Farms, it was observed that 46 per cent of the households belonged to family size group of 5 and 6 followed by less than 5 size group which accounted for 33 per cent of the total. However, the family size group of more than 6 family groups accounted for only 20 per cent. The average family size was 4.75 and 5.22 for insured and non insured farm categories respectively. The reason for the relatively smaller family size of insured farmers when compared with that of Non insured farmers could be attributed to increased educational status of the insured farm households.

5.2.4. Farming Experience of the Head of the Sample Households

Farming experience influences the farming efficiency and adoption of modern farm technologies and they may have better access to banking institutions. Therefore, the years of farming experiences of head of the sample farms were assessed and the results are furnished in Table 5.9.

Table 5.9 Farming Experience of Sample Respondents **(Number)**

S. No	Farming experience (years)	IBF	INBF	Insured Farmers	NIF	Total
1	<10	18 (30.00)	4 (13.33)	22 (24.44)	3 (10.00)	25 (20.83)
2	11-20	19 (31.66)	14 (46.66)	33 (36.66)	13 (43.33)	46 (38.33)
3	>21	23 (38.33)	12 (40.00)	35 (38.90)	14 (46.67)	49 (40.83)
	Total	60 (100.00)	30 (100.00)	90 (100.00)	30 (100.00)	120 (100.00)
	Average	23.83	25.09	24.46	27.88	25.60

Figures in parentheses indicate percentage to total

The sample farmers, on an average, had more than 25 years of farming experience and non insured farmers were more experienced (27 years) in farming than that of the by insured farmers 24 years. Overall, non insured farmers were found to have more farm experience. From Table 5.9, it could also be observed that 40 per cent of the total number of farmers had more than 21 years of farm experience, 38 per cent of farmers had 11 to 20 years of experience and 20 per cent of farmers had less than 10 years of experience.

5.3 Farm Resources Utilization by Sample Respondents

Details on size of holding, capital assets, livestock and implements possessed by the sample farm households are discussed under this sub-section.

5.3.1 Land Holdings

Farm size is positively related to unit cost of operation and generation of levels of farm income and employment and hence the same is discussed here. The sample respondents were post stratified into marginal, small, semi-medium, medium and large farms taking into consideration the size of the farm. The details on category wise distribution of sample respondents in the study area are presented in Table 5.10. Among the selected respondents, there were more number of small farmers (42 per cent of the total number of farmers) followed by marginal farmers (34 per cent), medium farmers (19 per cent) and large farmers (5 per cent) and the average size of land holding was 1.61 hectare.

Table. 5.10. Land Holding Pattern of the Sample Farms (Number)

S. No	Area owned (ha)	IBF	INBF	Insured Farmers	NIF	Total
1	<1	21 (35.00)	12 (40.00)	33 (36.66)	8 (26.66)	41 (34.16)
2	1 to 2	25 (41.66)	15 (50.00)	40 (44.44)	10 (33.33)	50 (41.66)
3	2 to 4	13 (21.66)	3 (10.00)	16 (17.77)	7 (23.33)	23 (19.16)
4	>4	1 (01.66)	0	1 (01.11)	5 (16.66)	6 (05.00)
5	Total	60 (100.00)	30 (100.00)	90 (100.00)	30 (100.00)	120 (100.00)
6	Average size of land holding	1.47	1.39	1.43	1.97	1.61

Figures in parenthesis indicate percentage to total.

The Table 5.10 above would reveal that majority of Insured farmers had cultivated less than 2.00 Ha (81 per cent) and 69 per cent of Non Insured farmers members fell under this category. Majority of IBF (41 per cent), INBF (50 per cent) and NIF (33 per cent) fell under small farmers category. Sixteen per cent of non insured farmers were large farmers where as only 1 per cent of insured farmers were under large farmers category. Eighteen per cent of the insured farmers were medium farmers where as 23 per cent of Non Insured farmers where large farmers. The average size of land holding was high for Non Insured farmers (1.97 ha) where as for Insured farmers, it was 1.43 ha.

5.3.2 Livestock Position

Livestock population, especially dairy animals provide regular income to the farmers. Hence, livestock position of the sample respondents is given in Table 5.11. It could be observed from Table 5.11 that the sample farmers reared more number of poultry followed by milch cows, sheep/goats, buffalo and draught animal. Insured Benefitted farmers reared nearly five sheep/ goats, while Insured Non Benefitted farmers reared less than 2 goats and more than two goats were owned by the Non Insured farmers. On an average, all the sample farmers nearly had a pair of milch animals. However, Non Insured farmers reared three milch animals. On an average, the numbers of poultry birds maintained by the sample farmers was 15 numbers. In case of non-insured farms, maximum number of birds were maintained (18 numbers) followed by insured farmers (13 numbers) respectively. Thus for NIF had more number of livestock when compared to that of insured farmers due to larger land holdings possessed by NIF.

Table 5.11 Average Livestock Position of Sample Respondents (Nos/farm)

S.No	Particulars	IBF	INBF	NIF	Total
1	Milch cow	1.75	1.68	2.30	1.91
2	Milch buffalo	0.43	0.59	0.63	0.55
3	Draught animal	0.31	0.33	0.40	0.34
4	Sheep/Goat	4.59	1.66	2.06	1.77
5	Poultry	13.23	13.66	18.33	15.07
6	Total	21.31	17.92	23.72	20.98

5.3.3. Asset value

The asset position of the sample farms formed the important factor for getting various loans from the banks, i.e., it acts as a security and also acts as the coping mechanism to overcome the risk in case of crop failure and hence, it is discussed.

Table 5.12 Value of Farm Buildings, Machineries and Equipments in the Sample Farms

(Rs/Net Operated Area)

S.No	Type of Asset	IBF	INBF	NIF	Total
I	**Farm Buildings**				
1	**Farm House**	61387.93 (62.21)	67526.72 (61.24)	74954.66 (60.07)	67956.43 (61.09)
2	**Pump shed**	9263.38 (09.38)	9726.54 (08.82)	11671.86 (09.35)	10220.55 (09.18)
3	**Cattle shed**	5127.71 (02.18)	5743.03 (05.20)	7121.36 (05.70)	5996.36 (05.39)
II	**Livestock**	14744.75 (14.94)	16071.78 (14.57)	17678.96 (14.16)	16165.16 (14.53)
III	**Machineries**				
1	**Electric Motor**	6033.12 (06.11)	6757.09 (06.12)	8243.65 (06.60)	7011.25 (06.30)
2	**Sprayer**	2119.35 (02.14)	2225.31 (02.01)	2892.91 (02.31)	2412.52 (02.16)
IV	**Equipments**				
1	**Minor implements**	2117.93 (02.14)	2202.64 (01.97)	3005.17 (02.40)	2441.91 (02.19)
	Total	98,676.24 (100.00)	110253.1 (100.00)	124766.1 (100.00)	111231.73 (100.00)

Figures in parentheses indicate percentage to total.

Farm buildings, livestock and implements possessed by the sample farmers are presented in Table 5.12. Total value of farm assets per ha of net operated area was Rs. 1,11,231 for all the sample farmers, on an average. Asset value was more in case of Non Insured farmers (Rs.1,24,766) followed by Insured Non Benefitted farmers (Rs. 1,10,253) and Insured Benefitted farmers (Rs.98,676.24). Farm house accounted for a maximum value and it was followed by livestock, pump shed, cattle shed and so on in all farm categories.

5.4 Investment Activity and Income of Sample Respondents

5.4.1 Cropping Intensity of Sample Farm Households

Size of land holdings would determine the credit requirements as well as the income and employment generation. Hence, in Table 5.13, net operated area, gross cropped area and cropping intensity in the sample farm households are given.

Table 5.13 Land Resources and Cropping Intensity of Sample Farm Households

(Ha/farm)

S.No	Particulars	IBF	INBF	Insured Farmers	NIF	Average
1	Net Operated Area	1.07	1.16	1.11	1.82	1.35
2	Gross Cropped Area	1.88	1.73	1.80	2.33	1.98
3	Cropping Intensity (%)	136.33	132.43	134.38	127.81	132.19

On an average, the size of net operated holding of the sample farmers was 1.35 ha. In case of Non Insured Farmers, it was 1.82 ha, 1.07 ha for Insured and Benefitted Farmers and 1.16 ha for Insured but Not benefitted Farmers. Cropping intensity was higher in insured farm (134.38 per cent) category followed by Non insured farmer (127.81 per cent). On the whole, the average cropping intensity was 132.19 per cent. The coverage of farms under Weather Based Crop Insurance Scheme increased the cropping intensity.

5.4.2 Cropping Pattern

The cropping pattern of the sample farms will give an insight on the practice of agriculture and indirectly on the income of the farms in the study area. Hence, the above are discussed in Table 5.14 to know the area under different crops grown in the study area.

Paddy, groundnut, pulses, maize and tapioca were the major crops grown by the sample respondents.. Paddy occupied more than 35 per cent (about one-third) of the total cultivated area by all the sample respondents. Non insured farmers allocated more area (41 per cent) to paddy followed by Insured but Not benefitted Farmers (32 per cent) and Insured and Benefitted Farmers (29 per cent). Next to paddy, groundnut occupied a larger area (32 per cent) under cultivation by all the sample respondents. Among the different farm categories, groundnut was largely grown by Insured and Benefitted Farmers (40 per cent) followed by Insured but Not Benefitted Farmers (33.52 per cent) and Non Insured Farmers (33.47 per cent).

Table 5.14 Cropping Pattern of Sample Farm Households

(Area in Ha/ farm)

S. No	Particulars	IBF	INBF	NIF	Total
1	Paddy	0.55 (29.25)	0.55 (31.79)	0.96 (41.20)	0.68 (34.85)
2	Ground Nut	0.75 (39.89)	0.58 (33.52)	0.78 (33.47)	0.70 (32.26)
3	Pulses*	0.50 (26.59)	0.49 (28.32)	0.38 (16.30)	0.45 (23.66)
4	Maize	0.04 (02.12)	0.03 (01.73)	0.03 (01.28)	0.03 (01.65)
5	Tapioca	0.04 (02.12)	0.08 (04.62)	0.18 (07.72)	0.10 (04.51)
6	Total	1.88 (100.00)	1.73 (100.00)	2.33 (100.00)	01.98 (100.00)

*Includes Black gram, Green gram and Cow pea

Figures in parentheses indicate percentage to total cropped area.

Pulses were the third major crops grown by the sample farmers to an extent of 24 per cent of the total cultivated area. Pulses was largely grown by Insured but Not benefitted Farmers (28 per cent) followed by Insured and Benefitted Farmers (27 per cent) and Non insured farmers (16 per cent). Maize and tapioca were also grown to an extent of 6 per cent of the total cultivated area by all the sample respondents.

5.4.3 Cost and Returns from Crop Activities

Farmers grew different crops in their farms and per ha cost and returns for the crops grown are presented in Table 5.15. On an average, a total cost of Rs. 35138 was incurred by all the sample farmers per ha of gross cropped area. Total cost was higher (Rs. 39552) in case of Non Insured Farmers followed by Insured but Not benefitted Farmers (Rs 34031) and Insured and Benefitted Farmers (Rs. 31831). Out of the total cost, 59 per cent was incurred as variable cost and remaining 41 per cent was fixed cost. Average variable cost was found to be higher (accounting for 62.3 per cent of the total cost) in case of Insured and Benefitted Farmers followed by insured and not claim settled farmers (accounting for 60.0 per cent) and non-insured farmers (accounting for 54.9 per cent).

All together, per hectare total fixed cost was found to be higher in case of non-insured farmers (Rs. 17821) followed by insured and non claim settled (Rs. 13615) and insured claim settled farmers (Rs. 11999). Per hectare gross income was higher in case of non-insured farmers (Rs. 51636) followed by the insured and non claim settled (Rs. 49205) and claim settled farmers (Rs. 42427). Among variable cost, human labour changes accounted for a maximum of 17 per cent of the total cost, and they were followed by manures and fertilizers (15.3 per cent) and so on. A high per hectare net income was realized by Insured but Not benefitted Farmers (Rs. 15,174) followed by Non insured farmer (Rs.12084) and Insured and Benefitted Farmers (Rs. 10596).

The gross and net income in case of Insured and Benefitted Farmers were found to be lower when compared with that of Insured but Not benefitted Farmers and Non insured farmers. This was due to the fact that the insured crops, namely, paddy and groundnut were damaged due to adverse climatic factors in Insured and Benefitted Farms. In case of Insured but Not benefitted Farms, the insured crops, namely paddy and groundnut, were not affected by the adverse natural factors. Hence, Insured but Not benefitted Farmers got higher returns. This has been further confirmed by the fact that this insured but Not benefitted Farmers category did not receive any indemnity under Weather Based Crop Insurance Scheme as their insured crops were not affected by adverse weather parameters. After the payment of indemnity to IBF for the loss occurred in paddy and groundnut cultivation by IBF, the average net income per ha of GCA had increased from Rs 10596 to Rs 1452 which accounted for an increase of 27 percent

Productivity, cost of production and returns (per unit of product) of the major crops, namely, paddy, groundnut are presented in Table 5.16 .In case of paddy, high productivity (3599 kg /ha) was realized by insured and non claim settled farmers, while productivity levels of 3568 kg/ha was realized by non-insured farmers and the insured claim settled farmers realized the lower productivity level (3212kg/ha). Maximum productivity in case of groundnut (1445 kg /ha) was realized by non-insured farmers, while productivity level of 1371kg/ha was realized by insured and non claim settled farmers and insured claim settled farmers had a lower productivity level of 1297kg/ha. The non-insured farmers did not take up any insurance products as they normally do not suffer out of risk of yield loss due to adverse weather condition.

Table 5.15 Cost and Returns of sample Respondents per ha of GCA per year

(Rs./ha GCA)

S. No	Particulars	IBF		INBF		NIF		Total	
		Amount (Rs)	Percentage	Amount (Rs)	Percentage	Amount (Rs)	Percentage	Amount (Rs)	Percentage
A.	**Variable cost**								
1	Human Labour	5800	18.2	6100	17.9	6300	15.9	6067	17.3
2	Bullock Labour	950	3.0	870	2.6	1020	2.6	947	2.7
3	Machine Power	3650	11.5	3250	9.6	3850	9.7	3583	10.2
4	Seed/Seedlings	1500	4.7	1560	4.6	1574	4.0	1545	4.4
5	Manure and Fertilizers	5040	15.8	5550	16.3	5557	14.1	5382	15.3
6	Plant Protections	1070	3.4	1080	3.2	1180	3.0	1110	3.2
7	Miscellaneous	700	2.2	850	2.5	1020	2.6	857	2.4
8	Interest on Working Capital	1123	3.5	1156	3.4	1230	3.1	1169	3.3
	Sub-total (1)	19833	62.3	20416	60.0	21731	54.9	20660	58.8
B.	**Fixed Cost**								
1	Rental value of land	6776	21.3	7435	21.8	6430	16.3	6880	19.6
2	Interest on owned fixed capital	2964	9.3	2781	8.2	6569	16.6	4105	11.7
3	Depreciation of Implements & Buildings	2021	6.3	3141	9.2	4561	11.5	3241	9.2
4	Payments Land Revenue and cess	238	0.7	259	0.8	260	0.7	253	0.7
	Sub-total (2)	11999	37.7	13615	40.0	17821	45.1	14478	41.2
	Total (A+B)	**31831**	**100.0**	**34031**	**100.0**	**39552**	**100.0**	**35138**	**100.0**
	Gross Income	42427	-	49205	-	51636	-	45422	-
	Net Income	**10596**	**-**	**15174**	**-**	**12084**	**-**	**12618**	**-**
	Net Income + Indemnity	**13526**	**-**	**15174**	**-**	**12084**	**-**	**13594**	**-**

Table 5.16 Cost and Returns for the Selected Crops Cultivated in the Sample Farm Household

S.No	Particulars	Production (Kg/ha)	Gross return (Rs/Kg)	Cost of Production* (Rs/Kg)	Net return (Rs/Kg)	Cost of Cultivation
I	Paddy					
a	IBF	3212	11.54	10.56	0.98	35803
b	INBF	3599	11.6	9.25	2.35	33234
c	NIF	3568	11.44	8.33	3.11	29718
d	Total	3459	11.53	9.38	2.15	32918
II	Groundnut					
a	IBF	1297	22.87	13.31	9.56	15802
b	INBF	1371	22.91	11.47	11.44	15572
c	NIF	1445	23.1	11.81	11.29	15815
d	Total	1338	23.0	12.2	10.8	15730

* Cost refers to Cost C_3 (For details, vide cost concepts in Chapter III)

5.4.4. Distribution of Average Income Realized by the Sample Respondents

Distribution of average income from different sources would reveal that households have diversified activities and depended on more than one source of income. Agriculture, livestock and wage employment were the most common sources of income in rural area. All the selected respondents had taken up agricultural and allied activities as a primary source of income.

Distribution of income received through different sources by the selected respondents is given in Table 5.17

Table 5.17 Distribution of Average Income Realized by the Sample respondents

(Rs per hectare of gross cropped area)

S. No	Respondents	Average annual income				Total
		Crop	Livestock	Off -farm	Non -farm	
1	IBF	42,427 (69.68)	3,365 (5.53)	10,960 (18.00)	4,134 (6.79)	60,886 (100.00)
2	INBF	49205 (73.81)	3,140 (4.71)	8,680 (13.02)	5,640 (8.46)	66665 (100.00)
3	NIF	51636 (71.48)	4,500 (6.23)	7,530 (10.42)	8,570 (11.86)	72236 (100.00)

Figures in parenthesis indicate percentage to total.

From the above table, it could be observed that average crop income in case of Insured and Benefitted Farmer (IBF)(Rs. 42,427) was lower than Insured but Non Benefitted Farmer (INBF)(Rs.49,205) and Non Insured Farmers (Rs.51,636) . The share of crop income of IBF was lesser (69 per cent) than that of INBF (73 per cent). Live stock income was more in case NIF than IBF and INBF as the NIF maintained more number of farm animals. The off farm income in case of IBF was also more than that of non NIF as many family members of the IBF were working in others farms. The non farm income in case of NIF was more than that of IBF and INBF, i.e., it was Rs 8,570 in case of NIF and Rs 5,640 in case of INBF and Rs.4,134 in case of IBF.

5.5.1 Assessment of Crop Loss and Financial Support

The extent of crop loss faced by the sample farmers and the financial support provided through WBCIS were given in Table 5.18

Table 5.18 Extent of Crop Loss and the Financial Support

Particulars	Normal Yield (Kg/Ha)		Actual Yield (Kg/Ha)		Crop Loss (Per cent)		Indemnity (Rs. / ha)	
	PADDY	GROUNDNUT	PADDY	GROUNDNUT	PADDY	GROUNDNUT	PADDY	GROUNDNUT
IBF	3500	1482	3212	1297	08.22	12.48	7451	1702
INBF	3500	1482	3598	1371	0	07.46	0	0
NIF	3500	1482	3368	1445	03.77	0.02	0	0

The percentage of crop loss varied from 00.02 per cent to 12.48 per cent during the season of kariff 2009 in the farms of the sample respondents. In case of paddy, Insured and Benefitted Farmers accounted for the 8 per cent of the crop loss whereas Insured but Not benefitted Farmers did not account for any loss, whereas non-insured farmers have accounted for 4 per cent of crop loss. In case of groundnut, the crop loss faced by Insured and Benefitted Farmers was more (12 per cent), followed by Insured but Not benefitted Farmers accounting for 7 per cent of crop loss, and Non Insured farmer facing less than 1 per cent of crop loss.

It is surprising to know that in case of financial support provided for the insured farmers for paddy was more (Rs. 7451) when compared to that of groundnut (Rs. 1702) even though ground nut accounted for more crop loss (12 per cent) when compared to paddy (8 per cent). Insured but Not benefitted Farmers have accounted for 7 per cent of crop loss in ground nut but did not receive any kind of indemnity, due to the fact that the physical yield loss suffered by them could not be incorporated in the indemnity. This only would indicate the flaw in the design of the insurance product.

5.5.2 Loss Restorability

The actual loss attained by the farmers, the financial support provided by the insurer and the percentage of loss restored were analyzed and the results are presented in Table 5.19

Table 5.19 Percentage of Loss Restored to Sample Farmers

S.No	Loss in Rs.		Financial support in Rs.		Crop loss restore (in per cent)	
	Paddy	Groundnut	Paddy	Groundnut	Paddy	Groundnut
IBF	3323	4070	7451	1702	224	41.81
INBF	0	2464	0	0	0	0
NIF	1523	814	0	0	0	0

The data in Table 5.19 could indicate that the loss restored for paddy was very high (224 per cent) and for groundnut it was only 42 per cent. Though the Weather Based Crop Insurance Scheme aimed to restore the crop loss of the farmers, there existed a pounced variation in the total percentage of crop loss restored between paddy and ground nut and obviously, this was due to variations in the exposure of the crops to damage caused by weather parameters, i.e., the magnitude of damage due to adverse weather was different for different crops.

The variation in loss restorability was due to the homogeneous weather based area approach followed by the insurer for assessing the crop loss. In particular, if the crop loss was high due to various factors like pest, disease etc other than weather parameters then the crop loss was not compensated. In the study block, crops were severely affected due to continuous dry spells and pest attack. There existed a wide variation between crops with reference to restorability. This was due to the existence of the Basis risk i.e., difference in risk assessed by the insurance product and the actual risk faced by the farmers, due to variation in rainfall between the selected villages and the Reference Weather Station and difference in crop period and cover period.

5.6 Production Function Analysis

To evaluate the factors influencing farm income per ha of gross cropped area of the sample households and also to examine their relative influence, production function was fitted. The Cobb-Douglas production function was used and the production elasticities were estimated accordingly. The production function was estimated for Insured and Benefitted Farmers, Insured but Not Benefitted Farmers and Non insured farmers separately using Ordinary Least Square (OLS) method. The estimated values of the regression coefficients were tested for statistical significance with the help of‘t’ test and the significance of the equation was tested by ‘F’ test for R^2. The independent variables used in were human labour (Rs/ha), machine power (Rs/ha), manures and fertilizers (Rs/ha), cost of seed (Rs/ha) and cost of plant protection chemicals (Rs/ha).

The results of production function analysis relating farm income of sample farmers and factors influencing the income are shown together for Insured and Benefitted Farmers, Insured but Not benefitted Farmers and Non insured Tables 5.20 respectively.

Table 5.20 Estimates of the Regression Analysis

S.No.	IBF		INBF		NIF	
	Explanatory variables	t-ratio	Explanatory variables	t-ratio	Explanatory variables	t-ratio
Intercept	3.737***	5.815	5.025***	4.306	7.319***	4.915
Cost of Human labour	0.321***	2.830	-0.039	-0.207	0.170*	1.960
Cost of Machine power	0.288***	2.895	0.386***	2.967	0.094	0.810
Cost of Manures and fertilizers	0.141	1.444	0.088	0.501	-0.027	-0.137
Cost of seed	0.388***	7.332	-0.005	-0.059	0.143*	1.620
Cost of plant protection chemicals	-0.437***	-4.406	0.274*	1.960	-0.021	-0.208
R Square	0.82		0.61		0.66	
Adjusted R Square	0.807		0.533		0.59	
F- value	50.58***		7.62***		9.544***	

*** and * indicates significance at 1 per cent and 10 per cent respectively.

Considering the equation obtained for the insured claim settled farmers, four out of five parameter estimates were significant ($p<0.01$). These were the value of cost of human labour per hectare, cost of machine power per hectare, cost for seed per hectare and cost of plant protection chemicals. It appears that all those four inputs exerted greater influence on the level of output obtained by the farmers. All the included variables except the use of plant protection chemicals were positively and correctly signed.

The output (farm income) elasticities with reference to cost of seed was high and positive with 0.39 followed by human labour (0.32) and machine labour (0.29). The cost of plant protection chemicals had the output elasticity of -0.44 indicating over use of it.

For the insured but not benefitted farmers, only one of the included explanatory variables i.e., cost of machine power per hectare was significant at the $p<0.01$ level. However the use of plant protection chemicals were found to be significant at $p<0.1$ level. As explained above, the high significance of the parameter estimates of these variables would imply that they exerted greater influence on the level of farm income achieved by the insured but not benefitted farmers.

Farm income elasticities with reference to machine power was maximum and positive with 0.38 followed by cost of plant protection chemicals (0.27). The cost of human labor and cost of seed had the negative elasticities with values - 0.039 and – 0.005 respectively but they were found statistically non significant.

The production elasticities estimated from regression analysis for non-insured farmers are presented in Table 5.22. For the non-insured farmers, only two of the included explanatory variables were significant at the $p<0.1$ level. These variables were human labor and cost of seed per hectare. As explained above, the high significance of the parameter estimates of these variables implied that they exerted greater influence on the level of production achieved by the non-insured farmers.

The output i.e., farm income elasticities with reference to human labour and cost of seed were found high with value of 0.17 and 0.14 respectively. The negative elasticities of manures and fertilizer cost as well as plant protection chemical costs were however found statistically non-significant.

The R2 value indicated the proportion of the total variation in output that could be accounted for by the included independent variables. An R2 value of 82.40 per cent was obtained for the specified function for the Insured and Benefitted Farmers as compared to 61.4 per cent for the Insured but Not benefitted Farmers and 66.5 per cent for the Non-insured farmers. The high percentage values would show that the equations were the good representation of the relationship between farm output and the included independent variables. The adjusted R2 values allow a comparison of the R2 between different equations even with differences in the number of included explanatory variables.

The F-values of 50.58 and 7.62 and 9.54 were obtained for Insured and Benefitted Farmers, Insured but Not benefitted Farmers and Non insured farmer production functions, respectively. All the F-values were significant (at 1 per cent of probability). This showed that the included independent variables jointly exerted greater influence on the level of farm output generated by the respective farm groups.

The high R2 values estimated, the significance of the F-values and the results of the diagnostic tests confirmed the quality of the estimates and they would suggest that the equations can be relied upon for discussion, forecasting and for policy recommendation.

5.7. Assessment of Farmers' Awareness about the Weather Insurance Scheme

In this section, the sample farmers' awareness and satisfaction about the Weather Based Crop Insurance Scheme, necessity of the programme, impact of the scheme, suggestions regarding improvement of the existing scheme and finally their preference on the terms of insurance to insure their crops were collected, analyzed and presented.

5.7.1 Motivation for Taking up Crop Insurance

Views of the sample respondents on taking up the Weather Based Crop Insurance Scheme were solicited and the responses of the both Insured and Benefitted Farmers (IBF) and Insured but Not Benefitted Farmers (INBF) farmers on motivation for taking up insurance are shown in Table 5.21

Table 5.21 Motivation for taking up insurance to the Sample Farmers

S.No	Responses	IBF		INBF		Total	
		Number	Percentage	Number	Percentage	Number	Percentage
1	Due to banks' compulsion	22	36.66	16	53.33	38	42.22
2	Financial security	34	56.66	12	40.00	46	51.11
3	Heard of good experience from other farmers	4	06.66	2	06.66	6	06.66
	Total	60	100.00	30	100	90	100.00

From Table 5.21, it can be said that the main reason for taking up the crop insurance for the maximum number of farmers (51 per cent of the total number of sample respondents) was the financial security offered by the scheme (i.e., the indemnity that could be received in case of financial loss due to adverse weather parameters). Secondly, compulsion made by the banks was another reason for adopting the scheme. Around 40 per cent of farmers in both groups had replied it as a reason for their coverage under insurance scheme. About 7 per cent of farmers were included in scheme because of other farmers' influence, i.e., they heard of good experience from other farmers about the programme.

5.7.2 Awareness of Borrowers about the Features of Weather Insurance Scheme

The awareness regarding various aspects related to Weather Based Crop Insurance Scheme were collected and analyzed. The responses are presented in Table 5.22.

Table 5.22 Awareness of Borrowers in Availing WBCIS

S.No	Particulars	IBF		INBF	
		Numbers	percentage	Numbers	Percentage
1	Crops covered	45	75.00	25	83.33
2	Sum insured	50	83.33	25	83.33
3	Premium rate	38	63.33	23	76.67
4	Claim procedure	10	16.67	8	26.67
5	Facilities available at financial institution	47	78.33	17	56.67
6	Documentation	45	75.00	20	66.67
7	Area approach	15	25.00	12	40.00
8	Indemnity level	15	25.00	0	0.00
9	Loss assessment method	5	08.33	6	20.00
10	Total number of farmers	60	100.00	30	100.00

From the Table 5.22, it could be observed that more than two-thirds of the Insured and Benefitted farmers (IBF) and Insured but Not Benefitted Farmers (INBF) were aware of the WBCIS regarding crops covered, sum insured , premium charged, documentation and so on. However more than two third of the farmers of both categories did not know about the loss assessment method and claim procedure, i.e., WBCIS was mandatory for the loanee farmers and during the disbursement of the loan, certain amount (premium) was deducted from the loan amount by bankers. In most cases, the deduction of premium was not informed to the borrowers and in some cases, the borrowers also did not take much care to know about the interest rate, premium and so on. Farmers also were not aware of loss assessment method used in WBCIS. Therefore, the insurers and bankers are required to clarify all the details about components of WBCIS to the farmers.

5.7.3 Opinion of Borrowers in Availing Insurance Scheme

Opinion of the insured farmers regarding the WBCIS was presented in table 5.23

Table 5.23. Opinion of Borrowers in Availing Insurance Scheme

S.No	Particulars	IBF		INBF	
		Numbers	percentage	Numbers	Percentage
1	Satisfied with Crops covered	41	68.33	22	73.33
2	Satisfied with Sum insured	45	75.00	24	63.33
3	Satisfied with Premium rate	35	58.33	20	66.66
4	Satisfied with Claim procedure	5	13.33	0	0.00
5	Satisfied with Facilities available at financial institution	40	75.00	15	50.00
6	Satisfied with Documentation	30	50.00	11	36.66
7	Satisfied with area approach	14	23.33	7	23.33
8	Satisfied with Indemnity level	13	21.67	0	0.00
9	Satisfied with Loss assessment method	1	01.66	0	0.00
10	Total number of farmers	60	100.00	30	100.00

From Table 5.23, it could be concluded that majority of the farmers in both benefited and non benefited categories were satisfied with the crops covered by insurance scheme, i.e., 68 per cent farmers of benefited group and 73 per cent of non benefited group were satisfied with the crops covered. But in contrast, only 22 per cent of farmers from benefited groups were satisfied with the indemnity level whereas in case of non benefitted group none of the farmers was satisfied with the indemnity level because obviously, they did not receive any indemnity in spite of the fact that a few of them suffered yield loss due to weather adversity. Similarly, only one per cent farmers from benefited groups were satisfied with loss assessment method and there was none in case of non benefited farmers, and this was due to lack of transparency in the loss assessment method and the farmers also could not understand the complex procedures and features of the weather insurance product. In case of existing claim procedure also, 100 and 87 per cent of farmers from non benefited and benefited groups respectively, were not satisfied with the claim procedure. The main reason for this was that the banks did not notify about claims at the appropriate time to the farmers (the claim settlement process took a very long time- from six months to two years in some cases) and therefore farmers were unable to meet their losses at right time with the indemnity thereby facing all the adverse consequences of the yield loss to occur before the compensation was received by the insured. But as regards documentation was concerned 50 per cent of benefited and only 37 per cent of non benefited farmers were satisfied with existing procedure. This clearly would show that the farmers were completely unaware of claim procedure of indemnity level and loss assessment methods followed in WBCIS.

5.7.4 Awareness Regarding Premium and Indemnity

The amount of premium and indemnity in case of financial loss to farmers were the main factors that attracted them towards crop insurance. Therefore, awareness regarding the premium and indemnity of the insurance scheme was presented in table 5.24

Table 5.24 Awareness regarding premium and indemnity

S.No	Particulars	IBF		INBF	
		Numbers	Percentage	Numbers	Percentage
1	The premium rate charged was reasonable	35	58.33	20	66.66
2.	Farmers willing to pay high premium to insure their crops	25	41.66	10	33.33
3	Farmer aware of indemnity given through bank	15	25.00	0	0
4	Farmers who have received compensation at the right time	0	0.00	0	0
5	The compensation paid was inadequate	47	78.33	0	0
	Total number of farmers	60	100.00	30	100.00

From Table 5. 24, it could be observed that 58 per cent of benefitted farmers and 67 per cent of non benefitted farmers were comfortable with the premium rate charged. But 42 per cent of benefited and only 33 per cent of non benefited farmers were willing to pay higher premium to insure their crops. As the INBF did not receive any indemnity, most of them were not interested to pay higher premium. Most of the farmers felt that the premium was some kind of savings; they wanted to get compensation or the premium back, as they did not understand how insurance product worked by collectively pooling risk and transferring from one village / region to others. Among the benefitted farmers only 25 per cent farmers were aware of the fact that indemnity was given through bank. And surprisingly, none of the farmers got compensation at the right time, which clearly would be the major drawback of the scheme. Since the basic objective of the scheme was to provide compensation within 45 days after the end of the season, none of the farmers was informed by the financial agencies regarding the payment of indemnity.

5.7.5 Response of Non borrower and Non Insured Farmers

Responses of the non-insured farmers on the reasons for not availing the insurance scheme are given in the Table 5.25.

Table 5.25 Reason for not availing the Insurance

S.No	Particulars	Number	Percentage
1	Not aware of insurance scheme	4	13.33
2	No need of insurance	23	76.67
3	Lack of premium paying capacity	16	53.33
4	Not aware of the insurance facilities available	3	10.00
5	Not satisfied with reference unit area approach	14	46.67
6	Complex documentation	6	20.00
7	Lack of co-operation from banks	10	33.33
8	Lack of faith in weather based insurance scheme	19	63.33
9	Availing non institutional source of loan	9	30.00
10	Not satisfied with indemnity level	15	50.00
	Total number of farmers	30	100.00

According to Table 5.25, majority of the non insured farmers (77 per cent of the total number of farmers) felt that there was no necessity for insuring their crops and most (63 per cent) of them had no faith about the scheme i.e., they felt that there could be no fool-proof method of operating the scheme. Also 53 per cent of the farmers felt that the premium rate was on the higher side. Around 50 per cent of farmers were not satisfied with indemnity level. Forty six per cent of the farmers felt that area approach (linking with a remotely located Reference Weather Station) could not benefit them, i.e., they were not aware of the loss assessment method and spatial variations in the weather parameters, that may likely to occur. Not aware of crop insurance facilities available was another cause for only 10 per cent of farmers, whereas 20 per cent of farmers were not availing the scheme because of complex documentation procedure.

5.7.6 Preference of Terms of Insurance

The sample respondents were clearly explained about the terms of insurance, namely Multi Peril Insurance, Area based yield index and Weather index. Then the sample respondents were asked to indicate their preferences which are given in Table 5.26.

Table 5.26 Sample Farmers Preference on Terms of Insurance

S.No	Suggestions	IBF		INBF		NIF	
		Score	Rank	Score	Rank	Score	Rank
1.	Multi peril crop insurance	76	I	56	II	73	I
2.	Area based yield index	65	II	73	I	56	II
3.	Weather index	45	III	35	III	45	III

As terms of insurance was concerned, according to Table 5.26, Multi peril crop insurance was the main suggestion by insured and benefitted farmers, which got a score of 76 in Garret's Ranking procedure, and it was followed by area based yield index with 65 score and weather index with 45 score. Insured but Not benefitted farmers (INBF) expressed that Area based yield index (73) would be much better followed by multi peril crop insurance (56) and weather index (35) respectively. In case of Non Insured Farmers (NIF), multi peril crop insurance (73) was their main suggestion followed by area based yield index (56) and weather index (45). This would shows that most of the sample respondents were not in favor of weather insurance, i.e., due to complex nature of the scheme.

5.7.7 Suggestions of the Insured and Non-Insured Farmers for Strengthening the WBCIS

The suggestions of the insured and non-insured farmers regarding the improvement of the existing weather based crop insurance scheme were collected, analyzed and their response are presented in Table 5.27

Table 5.27 Suggestions of the Insured and Non-Insured Farmers for Strengthening the WBCIS

S.No	Suggestions	IBF		INBF		NIF	
		Score	Rank	Score	Rank	Score	Rank
1.	Coverage of more crops	33	**VII**	36	**VII**	61	**VI**
2.	Reduction in premium rate	45	**VI**	68	**II**	65	**III**
3.	Quick settlement of claims	73	**I**	64	**III**	71	**II**
4.	Making scheme voluntary	56	**V**	76	**I**	72	**I**
5.	Creation of separate insurance cell	68	**II**	54	**IV**	53	**V**
6.	Indemnity level should be increased	63	**III**	46	**VI**	55	**IV**
7.	Insurance service at door step	60	**IV**	48	**V**	45	**VII**

The ranks assigned to the suggestions for strengthening the WBCIS by the sample respondents were converted into scores using Garrett's table and results are presented in Table 5.27. The Insured and Benefitted Farmer (IBF) suggested that quick settlement of claims (73) was the most important things to do, that is, the bankers should inform about the indemnity payout at exact time followed by creation of separate insurance cell (68) which will make proper monitoring of the scheme and timely settlement and increase in indemnity level (63). The next important suggestion by them was insurance service at door step (60) which will make them to know exactly about the terms of insurance and claim procedure followed by making scheme voluntary (56).

In case of Insured but Non Benefitted Farmers, the farmers expressed that making scheme voluntary (76) was main suggestion, i.e., the insurance product was tied to the crop loans given by rural public sector lending system and the coverage was compulsory for the borrowers and it was not voluntary. In many cases, farmers themselves did not know that they were covered under insurance scheme, followed by reduction in premium rate (68) and quick settlements of claims (64). Other suggestions like creation of separate insurance cell (54) and insurance service at door step (48) were fourth and fifth important suggestions respectively.

As far as the Non Insured Farmers (NIF) were concerned, making scheme voluntary (72) was the main suggestion followed by quick settlements of claim (71) and reduction in premium rate (65). Moreover, suggestions like increase in indemnity level (55) and creation of separate insurance cell (53) came in fourth and fifth rank respectively.

CHAPTER VI

SUMMARY AND CONCLUSION

Agricultural insurance benefits farmers to stabilize farm income and investment and guard against disastrous effect of losses due to natural hazards or low market prices. Crop insurance not only stabilizes the farm income but also helps the farmers to initiate production activity after a bad agricultural year. It cushions the shock of crop losses by providing farmers with a minimum amount of protection. It spreads the crop losses over space and time and helps farmers make more investments in agriculture.

Weather Based Crop Insurance seeks to provide farmers compensation in case of happening or non-happening of a specific weather event that is likely to have bearing on the crop yields. In other words, the weather index measures a specific weather variable (e g, rainfall, temperature, relative humidity, wind speed, etc) and pays indemnities based not on the actual losses experienced by the insured, but rather on the realizations of the index (that proxies the loss in yield owing to the adverse weather incidence). WBCIS is being implemented in five districts of Tamil Nadu namely Ariyalur, Dharmapuri, Perambalur, Salem and Virudhunagar since Kharif, 2008. An attempt has been made to assess the impact of WBCIS on the farm income in Salem district and efforts were also made to identify the constraints faced by the insured so as to suggest solutions for further improvement of the scheme.

6.1 Objectives of the Study

The overall objective of the study is to assess the impact of Weather Based Crop Insurance Scheme in Salem district in terms of coverage of financial loss due to adverse weather parameters and generation of increased farm income. However, the specific objectives of the study are:

v. to assess the performance of the Weather Based Crop Insurance Scheme in Salem district of Tamil Nadu ;

vi. to estimate the extent of crop loss suffered by the sample farmers due to weather parameters and the actual risk covered by the insurer with respect to the sample farms ;

vii. to assess the impact of insurance scheme on farm income levels in the sample farms; and

viii. to study the problems faced by the farmers and suggest solutions for further refinement of the scheme.

This study was conducted in Salem district in Tamil Nadu. The Weather Based Crop Insurance Scheme was implemented through Primary Agricultural Cooperatives Societies and state agricultural department in both kharif and rabi seasons. Since kharif season was the most severely affected by natural calamities such as drought, farmers raising kharif crop were considered for the study. Sixty farmers who borrowed short term credit for the year 2009-10 and obtained the benefit of Weather insurance, i.e., indemnity, through PACS were selected for the study. These farmers are called Insured and Benefitted Farmers (IBF). Thirty insured farmers (covered under WBCIS 2009-10) who did not obtain indemnity were selected randomly from the villages where IBF were selected. They are called Insured but Not Benefitted Farmers (INBF). Apart from these two categories of insured farmers, viz., IBF and INBF, 30 Non Insured Farmers (who were not covered under WBCIS during 2009-10) were also selected randomly from the villages where IBF and INBF were selected. They are referred to as Non Insured Farmers (NIF).

The details regarding category wise distribution of land holdings, asset position, cropping pattern, pattern of income, cost and returns and farmers' awareness towards insurance scheme were collected through a structured interview schedule. The data collected were pertaining to the agricultural year of 2009-2010. The data collected were analyzed using the appropriate statistical tools like averages, percentages, cost concepts, production function and Garrett's ranking technique. The results of the analyses are summarized below:

6.2 Performance Analysis of Weather Based Crop Insurance Scheme

The Weather Based Crop Insurance Scheme was implemented in India during Khariff season of 2007 in Karnataka district on pilot basis. The results of state wise performance of WBCIS would show that Rajasthan has remained the dominant state with 60 per cent of the total number of farmers insured and accounting for almost half of the total area, liability and premium generated. Bihar was the second most important state, covering about 17 per cent of the total number of farmers insured. The other emerging states were Gujarat, Karnataka and Maharashtra as far as weather insurance was concerned. The result of crop wise performance would show that wheat was the most important crop accounting for one-third of the total number of farmers insured, acreage and premium generated. Paddy and gram amongst the food crops and cumin amongst the annual commercial and horticulture crops were the other important crops in terms of coverage. Overall, food crops and oilseeds accounted for more than 80 per cent of the coverage, insurance value and total premium generated and they also registered more than 90 per cent of the total indemnity payouts.

The weather based crop insurance scheme in Tamil Nadu was implemented from kharif season of year 2008. The results would show that the percentage of benefited farmers cover was on the decreasing trend. At the beginning of the scheme, i.e., kharif 2008, 40.6 per cent of total numbers of the farmers covered under WBCIS were benefitted. This number of benefitted farmers was gradually decreasing and at the Rabi 2009-10, it was only at 5.5 per cent. There was also a wide year-to-year fluctuations in case of number of farmers covered and settled with claims.

The WBCIS in Tamil Nadu was implemented in five districts of Tamil Nadu, namely, Ariyalur, Dharmapuri, Perambalur, Salem and Virudhanagar. Perambalur was in first rank in terms of number of farmers included, area covered and sum insured and it was followed by Salem district. Salem district had highest amount of farmer's premium as well as total premium, i.e., 41 per cent and 30 per cent of total respectively. In Salem district, 2308 farmers were insured under this scheme which was 24 per cent of the total number of farmers included. Farmer's claim ratio was 14 per cent and total claim ratio was 72.78 per cent. In Salem district, number of farmers insured, area covered by insurance, sum insured, total premium, total claim as well as number of benefited farmers were highest for banana. Paddy II and Groundnut were the second and third most important crops covered by the insurance scheme. Paddy II cultivated by 437 farmers and ground nut by 121 farmers in an area of 775 and 220 hectares respectively were covered under the scheme. It could also be inferred that total premium collected was Rs.81.01 lakhs whereas total claim given was only Rs.5.45 lakhs, that is, only 6 per cent of total premium was settled as claims. Out of 2308 farmers, only 170 farmers have been benefitted by this scheme accounting for 7.4 per cent.

6.3 General Characteristics of Sample Respondents

In the study area, the average age of all the sample farmers was 48 years and in case of insured farmers, the average age was 47 years, while in case of Non-insured farmers, the average

age was 49 years. The total literacy level was higher among Insured Farmers (78 per cent) when compared with that of Non-Insured Farmers (67 per cent). 62 per cent of the households in Insured farmers belonged to less than 5 family size group followed by the family size group of 5 to 6 accounting for 24 per cent and the family size group of more than 6 accounting for 11 per cent of the total. The average family size was 4.75 and 5.22 for insured and non-insured farm categories respectively. The sample farmers, on an average, had more than 25 years of farming experience and non insured farmers were more experienced (27 years) in farming than that of the insured farmers 24 years. Overall, non insured farmers were found to have more farm experience.

Among the selected respondents, there were more number of small farmers (42 per cent of the total number of farmers) followed by marginal farmers (34 per cent), medium farmers (19 per cent) and large farmers (5 per cent) and the average size of land holding was 1.61 hectare. The average size of land holding was high for Non Insured farmers (1.97 ha) where as for Insured farmers, it was 1.43 ha. Majority of Insured farmers had cultivated less than 2.00 Ha (81 per cent) and 69 per cent of Non Insured farmers members fell under this category. Majority of Insured and Benefitted Farmers (IBF) (42 per cent), Insured but Not Benefitted Farmers (INBF) (50 per cent) and Non Insured Farmers (NIF) (33 per cent) fell under small farmers category.

The sample farmers reared more number of poultry followed by milch cows, sheep/goats, buffalo and draught animal. NIF had more number of livestock when compared to that of insured farmers due to larger land holdings possessed by NIF.

Total value of farm assets per ha of net operated area was Rs. 1,11,231 for all the sample farmers, on an average. Asset value was more in case of Non Insured Farmers (Rs.1,24,766) followed by Insured Non Benefitted Farmers (Rs. 1,10,253) and Insured Benefitted Farmers (Rs.98,676.24). Farm house accounted for a maximum value and it was followed by livestock, pump shed, cattle shed and so on in all farm categories.

On an average, the size of net operated holding of the sample farmers was 1.35 ha. In case of Non Insured Farmers, it was 1.82 ha, 1.07 ha for Insured and Benefitted Farmers and 1.16 ha for Insured but Not benefitted Farmers. Cropping intensity was higher in insured farm (134.38 per cent) category followed by Non insured farmer (127.81 per cent). On the whole, the average cropping intensity was 132.19 per cent.

Paddy, groundnut, pulses, maize and tapioca were the major crops grown by the sample respondents. Paddy occupied more than 35 per cent (about one-third) of the total cultivated area by all the sample respondents. Non insured farmers allocated more area (41 per cent) to paddy followed by Insured but Not benefitted Farmers (32 per cent) and Insured and Benefitted Farmers (29 per cent). Next to paddy, groundnut occupied a larger area (32 per cent) under cultivation by all the sample respondents. Among the different farm categories, groundnut was largely grown by Insured and Benefitted Farmers (40 per cent) followed by Insured but Not benefitted Farmers (33.52 per cent) and non-insured farmers (33.47 per cent).

6.4 Cost and Returns

On an average, a total cost of Rs. 35138 was incurred by all the sample farmers per ha of gross cropped area. Total cost was higher (Rs. 39552) in case of Non Insured Farmers followed by Insured but Not benefitted Farmers (Rs 34031) and Insured and Benefitted Farmers (Rs. 31831). Out of the total cost, 59 per cent was incurred as variable cost and remaining 41 per cent was fixed cost. Average variable cost was found to be higher (62.3 per cent of the total cost) in case of Insured and Benefitted Farmers followed by Insured and not claim settled farmers (60.0 per cent) and Non-Insured Farmers (54.9 per cent).

All together, per hectare total fixed cost was found to be higher in case of non-insured farmers (Rs. 17821) followed by insured and non claim settled (Rs. 13615) and insured claim settled farmers (Rs. 11999). Per hectare gross income was higher in case of non-insured farmers (Rs. 51636) followed by the insured and non claim settled (Rs. 49205) and claim settled farmers (Rs. 42427). Among variable cost, human labour changes accounted for a maximum of 17 per cent of the total cost, and they were followed by manures and fertilizers (15.3 per cent) and so on. A high per hectare net income was realized by Insured but Not benefitted Farmers (Rs. 15,174) followed by Non insured farmer (Rs.12, 084) and Insured and Benefitted Farmers (Rs. 10596).

In case of paddy, high productivity (3599 kg /ha) was realized by insured and non claim settled farmers, while productivity level of 3568 kg/ha was realized by non-insured farmers and the insured and claim settled farmers realized a lower productivity level (3212 kg/ha). Maximum productivity in case of groundnut (1445 kg /ha) was realized by non-insured farmers, while productivity level of 1371 kg/ha was realized by insured but not claim settled farmers and insured claim settled farmers had a lower productivity level of 1297 kg/ha.

The average crop income in case of Insured and Benefitted Farmer (IBF) (Rs. 42,427) was lower than Insured but Non Benefitted Farmer (INBF) (Rs.49,205) and Non Insured Farmers (Rs.51,636). The share of crop income of IBF was also lesser (69 per cent of the total farm income) than that of INBF (73 per cent). Live stock income was more in case of NIF than IBF and INBF. This was due to more number of livestock maintained by NIF. The off farm income in case of IBF was also more than that of NIF as many family members of the IBF were working in others farms. The non farm income in case of NIF was more than that of IBF and INBF, i.e., it was Rs 8,570 in case of NIF and Rs 5,640 in case of INBF and Rs.4,134 in case of IBF.

6.5 Assessment of Crop Loss and Financial Support

The percentage of crop loss varied from 00.02 per cent to 12.48 per cent during the season of kariff 2009 in the farms of the sample respondents. In case of paddy, Insured and Benefitted Farmers accounted for 8 per cent of the crop loss whereas Insured but Not benefitted Farmers did not account for any loss, whereas non-insured farmers accounted for 4 per cent of crop loss. In case of groundnut, the crop loss faced by Insured and Benefitted Farmers was more (12 per cent), followed by Insured but Not benefitted Farmers accounting for 7 per cent of crop loss, and Non Insured farmers were facing less than 1 per cent of crop loss.

The financial support provided for the insured farmers for paddy was more (Rs. 7451) when compared to that of groundnut (Rs. 1702) even though ground nut accounted for more crop loss (12 per cent) when compared to that of paddy (8 per cent). Insured but Not benefitted Farmers have accounted for 7 per cent of crop loss in ground nut. The loss restored by the insures for paddy was very high (224 per cent) and for groundnut, it was only 42 per cent.

6.6 Production Function Analysis

The production function analysis was taken up for Insured and Benefitted Farmers, Insured but Not benefitted Farmers and Non Insured Farmers with the view to determine the resource-use efficiency of the resources used in crop production.

The production elasticities estimated from regression analysis for Insured and Benefitted Farmers would indicate that the output (farm income) elasticities with reference to cost of seed was high and positive with 0.39 followed by human labour (0.32) and machine labour (0.29). The cost of plant protection chemicals had the output elasticity of -0.44 indicating over use of it.

The production elasticities estimated from regression analysis for Insured but Not Benefitted Farmers would reveal that farm income elasticities with reference to machine power was maximum and positive with 0.39 followed by cost of plant protection chemicals (0.27). The cost of human labor and cost of seed had the negative elasticities with values - 0.039 and – 0.005 respectively but they were found statistically non significant.

The production elasticities estimated from regression analysis for non-insured farmers would indicate that the output, i.e., farm income elasticities with reference to cost of human labour and seed were found high with value of 0.17 and 0.14 respectively. The negative elasticities of manures and fertilizer cost as well as plant protection chemical costs were however found statistically non-significant.

6.7 Assessment of Farmers' Awareness about the Weather Based Crop Insurance Scheme

The main reason for taking up the crop insurance for the maximum number of farmers (51 per cent of the total number of sample respondents) was the financial security offered by the scheme. Secondly, compulsion made by the banks was another reason for adopting the scheme. Around 40 per cent of farmers in both groups had replied it as a reason for their coverage under insurance scheme. More than two thirds of the insured farmers did not know about the loss assessment method and claim procedure.

Majority of the farmers in both benefited and non benefited categories were satisfied with the crops covered by insurance scheme. But, only 22 per cent of farmers from benefited groups were satisfied with the indemnity level whereas in case of non benefitted group none of the farmers was satisfied with the indemnity level. Similarly, only one per cent farmers from benefited groups were satisfied with loss assessment method and there was none in case of non benefited farmers. In case of existing claim procedure also, 100 and 87 per cent of farmers from non benefited and benefited groups respectively, were not satisfied with the claim procedure. 58 per cent of benefitted farmers and 67 per cent of non benefitted farmers were comfortable with the premium rate charged. Surprisingly, none of the Insured farmers got compensation at the right time.

6.8 Response of Non Borrower and Non Insured Farmers for Not Availing the WBCIS

The non insured farmers (77 per cent of the total number of farmers) felt that there was no necessity for insuring their crops and most (63 per cent) of them had no faith about the scheme i.e., they felt that there could be no fool-proof method of operating the scheme. Also, 53 per cent of the farmers felt that the premium rate was on the higher side. Around 50 per cent of farmers were not satisfied with indemnity level. Forty six per cent of the farmers felt that area approach (linking with a remotely located Reference Weather Station) could not benefit them.

6.8 Garrett's Ranking Technique for Identification of Suggestions of the Insured and Non-Insured Farmers for Strengthening the WBCIS

On terms of insurance, the insured and benefitted farmers ranked Multi peril crop insurance as the main suggestion with a score of 76 in Garret's Ranking procedure. Insured but Not Benefitted Farmers (INBF) expressed that Area based yield index (73) would be much better. In case of Non Insured Farmers (NIF), multi peril crop insurance (73) was their main suggestion.

The Insured and Benefitted Farmer (IBF) suggested that quick settlement of claims (73) was the most important thing to do. In case of Insured but Non Benefitted Farmers, the farmers expressed that making scheme voluntary (76) as the main suggestion. As far as the Non Insured Farmers (NIF) were concerned, making scheme voluntary (72) was the main suggestion followed by quick settlements of claim (71).

6.10 Conclusions

Based on the analytical results, the following conclusions were drawn.

- ► The total premium collected in Salem district during khariff 2009 was Rs.81.01 lakhs where as total claim given was only Rs.5.45 lakhs, that is, only 6 per cent of total premium was settled as claims. Out of 2308 farmers only 170 farmers have been benefitted by this scheme accounting for 7.4 per cent.
- ► The total cost of cultivation per ha was higher (Rs. 39552) in case of Non Insured Farmers followed by Insured but Not benefitted Farmers (Rs 34031) and Insured and Benefitted Farmers (Rs. 31831).

- The gross and net income in case of Insured and Benefitted Farmers were found to be lower when compared with that of Insured but Not benefitted Farmers and Non insured farmers. This was due to the fact that the insured crops, namely, paddy and groundnut were damaged due to adverse climatic factors in Insured and Benefitted Farms.
- Financial support provided for the insured farmers for paddy was more (Rs. 7451) when compared to that of groundnut (Rs. 1702) even though ground nut accounted for more crop loss (12 per cent) when compared to paddy (8 per cent). Insured but Not benefitted Farmers have accounted for 7 per cent of crop loss in ground nut but did not receive any kind of indemnity. This is due to the limitation of weather insurance product since it covered only the parametric weather events and thereby did not provide protection to all risks. There existed a wide variation between crops with reference to restorability.
- The non-insured farmers were more efficient in the bundle of resources used than that of insured farmers. This only proved the existence of moral hazard problem that was faced by the insurer. The insured farmers could not focus on better use of resources and they were more complacent about their management practices as they were assured of compensation owing to crop loss.
- Financial security and banks compulsion was the major reason for the undertaking of weather insurance.
- More than two third of the insured farmers were unaware of loss assessment method and claim procedure. Many of the non benefited and benefited groups, were not satisfied with the claim procedure.
- None of the insured farmers got compensation at the right time i.e., 45 days after the end of the season.
- The major reasons of non-insured farmers for not availing the insurance scheme were due to lack of necessity to undertake the scheme.
- Most of the insured and non-insured farmers suggested that terms of crop insurance should be based on Multi peril effects.

- ► The main suggestions of the insured and non-insured farmers for the improvement of the existing weather based crop insurance scheme were the quick settlement of claims and reduction in premium rate.

6.10 Policy Implications

Based on the analytical results and the established conclusions, the following policy prescriptions were drawn.

1. Insurance literacy among insured and non-insured farmers is needed to address the critical attitude and knowledge changes needed for them to appreciate crop insurance product. The farmers' need to be made aware of the claim structures, which at present are highly technical and complicated.
2. The present method of treating Reference Unit Area as one unit for recording the weather parameters could not take into consideration of basis risk between villages and between farms affected by weather parameters. Therefore, treating Reference Unit Area as an unit for assessing weather parameters needs consideration on priority basis by lowering the insurance unit to village level.
3. Investment in infrastructure like automatic rain gauges and data collection system will help in offering precise weather data.
4. Proper monitoring of the time regarding the settlement of the claims through creating insurance cell for every Reference Unit Area requires urgent attention.
5. Co-operatives need to be strengthened by educating their members about the importance of the weather insurance.
6. Further, more research can be done on a continuous basis to evolve location specific insurance products.

REFERENCES

A. BOOKS

Coughlan Anne, T, Erin Anderson, Louis W. Stern and Adel I. Ansary, **Marketing Channels**, (New Delhi: Prentice-Hall of India Pvt. Ltd., 2005), pp. 20.

Koutsoyiannis, A., **Modern Micro Economics**, (London: Macmillan Press Ltd; 1979), pp. 105-106.

Ferguson, C.E., **Micro Economic Theory,** (Homeland, Illinois, USA, 1981), pp. 203.

Raju, V.T. and D.V.S. Rao, **Economics of Farm Production and Management,** (New Delhi: Oxford and IBH Publishing Co. Pvt. Ltd., 1990), pp. 185.

Tandon, R.K. and S.P. Dhondyal, **Principles and Methods of Farm Management**, (Kanpur: Nibal Kebal Ram Press, 1971), pp. 5-7, 461.

B.JOURNALS/ PERIODICALS

Baba, S.H., M.H.Wani, S.A.Wani and Shahid Yousuf, "Marketed Surplus and Price Spread of Vegetables in Kashmir Valley", *Agricultural Economics Research Review*, 23: 115-127, 2010.

Balappa, S.R and L.B. Hugar, "Economics of Production and Marketing of Tomato in Karnataka", *Indian Journal of Agricultural Marketing*, 16(2), 18-25, 2002.

Bhende, M.J., "Agricultural Insurance in India: Problems and Prospects", Department of Economic Analysis and Research, National Bank for Agriculture and Rural Development, Occasional paper – 44, 2005.

Chandrakanth, M.G and N.S.P. Rebello, "Crop Insurance for Potatoes: A Case Study", *Financing Agriculture*, 4: 25-48, 1980.

Dandekar, V.M., "Crop Insurance in India", *Econ. Polit. Weekly*, 11(26): A61- A80, 1976.

Dandekar, V.M., "Crop Insurance in India" - A Review, 1976-77 to 1984-85, *Econ. Polit. Weekly*, 20(25&26): A46 - A59, 1985.

Desai, D.K., "Institutional Credit Requirements for Agricultural Production-2000 A.D.", *Indian Journal of Agricultural Economics*, 43(3): 1988.p.23.

Dantwala, M.L., "Estimates of Demand for Credit and its Role in Poverty Alleviation", *Indian Journal of Agricultural Economics*, 44(4): 416-422, 1989.

Dodke, L.B., S.S. Kalamkar, N.V. Shende and B.L. Deoghare, "Economics of Production and Marketing of Turmeric", *Indian Journal of Agricultural Marketing*, 16(2), 69-72, 2002.

Forster, C.W., "A Note on Efficiency in Traditional Agriculture - A Study Farm in Rural Delhi", *Indian Journal of Agricultural Economics*, 28(3): 61, 1973.

Garg, J.S., G.N. Singh and G.N. Singh, "Income Disparity between Dry Land and Irrigated Farms in District Kanpur, Uttar Pradesh", *Indian Journal of Agricultural Economics,* 23(3): 273, 1971.

Geyser., "Managing Weather Risk in Indian Agriculture", Microfinance Bulletin, 2 (1), 2008.

Gurdev Singh., "Crop Insurance in India", Working Paper No. 2010-06-01, Indian Institute of Management, Ahmedabad, 2010**.**

Horowitz, J.K and E.Lichtenberg , "Insurance, Moral Hazard, and Chemical Use in Agriculture" *American Journal of Agricultural Economics*, 75(4): 926-35, 1993.

Jorge, C.A., "Assessment of Crop Damage and Actuarial Methods", *Crop Insurance in Asia,* Asian Productivity Organization, Tokyo, 1987.

Jain, H and A.K.Sarawgi, "A Study on the Impact of Farm Credit on Farm Production Income and Employment in Selected Tribal Areas of Madhya Pradesh", *Land Bank Journal,* 20 (1): 53-69, 1981.

Jitendra Singh., G.P. Singh and Rajkishor, "Present Status and Economics of Organic Farming in the District of Udham Singh Nagar in Uttaranchal", *Indian Journal of Marketing,* 19, 135-144, 2006.

Kaul, J.L and S.K. Metha. "Impact of Transaction on Farm Income", *Indian Journal of Agricultural Economics,* 48(3): 13, 1977.

Kirve, N.V., D.S. Navdkar, V.R.Shete and J.T. Dorge, "Production and Marketing of French Bean", *Indian Journal of Agricultural Marketing,* 16(2), 60-63, 2002.

Michael, R.J., Nigel Key and Erik O'Donoghue, "Estimating the Extent of Moral Hazard in Crop Insurance Using Administrative Data", Paper presented at the principal paper session, "Applications of Quasi-Experimental Methods in Agricultural Economics," Allied Social Sciences Association annual meeting, Boston, January 6-8, 2006, *Oxford Journals*, 28(3): 381-390, 2006.

Mahalakshimi, K., "Cost and Return in Vanilla Cultivation – A Study with Special Reference to Coimbatore District", *Indian Journal of Marketing*, 47-54, 2009.

Manmohan, N., "Integrated Credit and Small Farmers", *Financing Agriculture*, 13 (1): 27-29, 1981.

Muniraj, R., "Problems in Financing Agriculture by Commercial Banks", *Financing Agriculture*, 29(1): 18-21, 1970.

Mishra, R., "Input of Irrigation in Production and Factor Use. A Case of Mayurkashi Canal in West Bengal", *Indian Journal of Agricultural Economics,* 39(3): 548, 1984.

Mishra, P.K., "Crop Insurance and Crop Credit: Impact of the Comprehensive Crop Insurance Scheme on Cooperative Credit in Gujarat". *Journal of International Development,* 6(5): 529-68, 1994.

Mishra, P.K., "Agricultural Risk, Insurance and Income", Vermont Ashgate Publishing Company, 1996.

Manojkumar K., B. Sreekumar and G. S. Ajithkumar, "Crop Insurance Scheme: A Case Study of Banana Farmers in Wayanad District", Discussion Paper No. 54 Kerala, Kerala Research Programme on Local Level Development, Centre for Development Studies, Thiruvananthapuram, 2003.

Ogumbamurn and Bankole, "The Borome State Co-operative Financing Agency: Its Credit Extension Service towards the State Agricultural Development through Increased Agricultural Productivity", *Economic Times*, Jan.30, 2000, pp. 4.

Olubiyo SO, Hill GP and JPG Webster, "Econometric Analysis of the Impact of Agricultural Insurance on Farming Systems in the Middle Belt, Nigeria", *African Journal of Food Agriculture Nutrition Management*, 9 (6), 2009.

Pathak, B.S., “Crop Insurance: Retrospect’s and Prospects”, Paper presented at the National Seminar on Crop Insurance through Cooperatives, (Mimeographed), Pune, 1986, pp. 24-26.

Pawan Dahiya, I.J. Singh and K.N. Rai, “Cost-Benefit Analysis of Ber Cultivation in Rohtak District of Haryana”, *Indian Journal of Agricultural Marketing*, 16(2), 48-52, 2002.

Patel, R.J. and P. Mahesh Bhatt, “Cost and Returns of Hybrid Bajra Seed Production in Gujarat”, *Agricultural Marketing*, 20(3): 17, 1997.

Raju, S.S. and Ramesh Chand., “Agricultural Insurance in India Problems and Prospects”, NCAP Working Paper No. 8, National Centre for Agricultural Economics and Policy Research, Pusa, New Delhi-110012, 2008.

Reno Nevada., “The Demand for Specialty - Crop Insurance: Adverse Selection and Moral Hazard”, Paper submitted to the Western Agricultural Economics Association Meetings, 1997.

Reshmy Nair (2010) “Weather-Based Crop Insurance in India: Towards a Sustainable Crop Insurance Regime?” , *Economic & Political Weekly*, 14 (34), 2010.

Reshmy Nair(2010) “Crop Insurance in India: Changes and Challenges”, Agriculture Insurance Company of India, Bangalore, 2010.

Ray, P.K., “Agricultural Insurance - Principles, Organization and Application to Developing Countries”, (Oxford: Pergamon Press): 2, 1967.

Rajur, B.C., B.L. Patil and H. Basavaraj, “Economics of Chilli Production in Karnataka”, *Karnataka Journal of Agricultural Sciences*, 21(2): 237-240, 2008.

Ramamurthy, K., M. Ramachandran and S.R. Subramanium, “The Influence of Farm Size on Resource Productivity”, *Madras Agricultural Journal*, 9 (1): 51-52, 1973.

Shastri, C.P., “Input-output Rations in Indian Agriculture”, Indian Journal of Agricultural Economics, 13(1): pp.34-42, 1958.

Sarthak Gaurav., “Managing Weather Risk in Indian Agriculture: Issues and Challenges”, *Hand in Hand Microfinance Bulletin*, 2 (1), July 2008.

Syed.M.Ashan and John Kurian, " Agricultural Risks and Public Policy in Developing Countries – The Case for Crop Insurance", Agricultural Insurance – a New Policy for Developing Countries, p.12, printed in Great Britain, 1985

Shukla, B.D., "Input-Output Relationship in Agriculture", *Indian Journal of Agricultural Economics,* 47(3): 509, 1966.

Sundar, A and S. Kombai Raju, "Production and Marketing Constraints in Gloriosa superba in Tamil Nadu", *Agricultural Marketing*, XLVII (2): 12-14, 2005.

Sharma, R., "Explanatory Notes on Some Important Terms Relating to Crop Loans", *Financing Agriculture,* 4(1): 29, 1972.

Singh, S.B and H.N. Patel, "Income Savings and Investment in Agriculture", *Indian Journal of Agricultural Economics,* 27(4): 3, 1972.

Shukla, B.D and S.D. Misra, "Impact of Co-operative Finance", *Financing Agriculture,* 1(3): 26, 1974.

Suryanarayana, K.S., "Resource Returns in Telengana Farms", *Indian Journal of Agricultural Economics,* 12(4): 20-26, 1958.

Salikram and S.B.L.Gupta, "Resource Productivity on Paddy in Chandauli Block of Varanasi District", *Agricultural situation in India,* 33(6): 373-379, 1978.

Salikram, "A Study of Resource Productivities on Adopter and Non-Adopter Farms in Varanasi District", *Agricultural Situation in India*, 32(4): 205-206, 1977.

Singh, B., "Productivity and Resource Structure: A Case Study of Agricultural Development of Gujarat", *Indian Journal of Agricultural Economics,* 35(3): 34-50, 1980.

Saini, G.R., "Farm Size, Productivity and Some Related Issues in Indian Agriculture: A Review", *Agricultural situation in India,* 34(11): 777-783, 1980.

Turvey Calum, G and Islam Zahirul, "Equity and Efficiency Considerations in Area versus Individual Yield Insurance", *Agricultural Economics,* 12(1), 1995, Pp 23-35.

Ulrich Hess., "Innovative Financial Services for India: Monsoon-Indexed Lending and Insurance for Small Holders", World Bank Staff Working Paper, Report No. 27096. Washington DC, USA: World Bank, 2003.

Waghmane, R.E and M.D. Mandal, "Rapporteur's Report of Income, Savings and Investments in Agriculture", *Indian Journal of Agricultural Economics*, 27(4): 1-10, 1972.

Walker, T.S and N.S.Jodha, "How Small Farm Households Adapt to Risk. In Peter Hazell, Carlos Pomareda and Alberto Valdes (eds.)", *Crop Insurance for Agricultural Development*, Baltimore and London, The Johns Hopkins University Press, 1986.

Xavier Gine., Robert Townsend and James Vickery, "Patterns of Rainfall in Rural India", Policy Research Working Paper No.4408, World Bank, Development Research Group, Finance and Private Team, November, 2007.

C.THESIS

Edward Crowther., " Insuring Disaster: A Study of Weather Index-Based Insurance in Developing World Agriculture", Unpublished M.Sc. Thesis, Development Studies of the School of Oriental and African Studies (University of London), 2007.

Kannan, K., "A Study of Income, Consumption, Investment and Employment pattern of Small Farms in Minjur Block, Chengalpattu District", Unpublished M.Sc., (Ag.) thesis submitted to Tamil Nadu Agricultural University, Coimbatore, 1981.

Resome, G.M., "Agricultural Financing by Commercial Banks-A Micro Level Analysis", (Unpublished M.Sc., (Ag.) thesis submitted to Tamil Nadu Agricultural University, Coimbatore, 1987).

Sivaharini, B., "Evaluation of Credit Policy in the Pesticide Market in Thanjavur District. A Study of M/S. Coromandel Indag products India Ltd", Unpublished M.Sc., (Ag.) thesis submitted to Tamil Nadu Agricultural University, Coimbatore, 1990.

Sudalaimani, M., "An Assessment of Market Potential for Tissue Culture Plantlets in India", Unpublished M.Sc., (Ag.) thesis submitted to Tamil Nadu Agricultural University, Coimbatore, 1991.

Senthil kumar, M., "Market Study on Mushrooms and Spawns", Unpublished M.Sc., (Ag.) thesis submitted to Tamil Nadu Agricultural University, Coimbatore, 1991

Santhi,S., "Comprehensive Crop Insurance Scheme in Agastheeswaram Block of Kanyakumari District-An Economic Appraisal", Unpublished M.Sc.(Ag) Thesis, Department of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore, 1991.

Subramanian.P., "Crop Insurance for Agricultural Development – A Economic Appraisal in Madurantakam Taluk of Chengalpattu District", Unpublished M.Sc.(Ag) Thesis, Department of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore, 1986.

Veerapandian, M., "Economics of Mixed Farming with Particular Reference to Dairying in Bhavani Block, Periyar District", Unpublished M.Sc., (Ag.) thesis submitted to Tamil Nadu Agricultural University, Coimbatore, 1983.

D.REPORTS/PUBLICATIONS

Chandrasekaran, M. and K. Mani, "Evaluating the Adaptability of Crop Insurance Schemes in Tamil Nadu" Department of Agricultural Economics, Coimbatore, 2009.

General Insurance Corporation of India Report, State Level Crop Insurance Cell, Madras, 1990.

Government of India -(2004): "Report of Joint Group on Review of Crop Insurance", Ministry of Agriculture, New Delhi., (2007): "Report of the Working Group on Risk Management in Agriculture for the Eleventh Five-Year Plan (2007-12)", Planning Commission, New Delhi.

FAO., "Crop Loss Assessment in Rice, Manila", International Rice Research Institute, P.4,1990.

Jerry Skees., Peter Hazel and Mario Miranda, "Developing Rainfall-Based Index Insurance in Morocco", Policy Research Working Paper no 2577, World Bank, 2001.

WEBSITES

www.ifmr.ac.in

www.aicofindia.org

www.indiastat.com

www.agroinsurance.com

www.tn.gov.in

Appendix -1. Crops Covered Under Kharif and Rabi Seasons In WBCIS

S.No.	Food crops & Oilseeds	Annual commercial /Annual Horticulture Crops	Food crops & Oilseeds	Annual commercial /Annual Horticulture Crops
1	Bajra	Chilly	Barley	Cashew nut
2	Blackgram	Cotton	Bengal gram	Chilly
3	Greengram	Onion	Chick pea	Coriander
4	Groundnut	Tomato	Gram	Cotton
5	Jowar	Orange	Groundnut	Cumin
6	Maize	banana	Jowar	Grapes
7	Paddy		Lentil	Isabgol
8	Pigeon Pea		Linseed	Mango
9	Ragi		Maize	Methi
10	Sesamum		Paddy	Onion
11	Soyabean		Rape & Mustard	Potato
12	Sunflower		Sesamum	Tomato
13	Tur		Sunflower	Kinnu
14	Moth		Wheat	Amla
15	Guar			Gherkin

Source: Agricultural Insurance Company of India Limited, Chennai

Appendix -2: State/Season-wise Farmers Covered and Benefited, Area Covered and Claims Settled under Pilot Weather Based Crop Insurance Scheme in India

(2007-2008 to 2009-2010)

States/Season	Farmers Covered	Area (Ha)	Claims Settled (Rs. in Lakh)	Farmers Benefitted
Kharif 2007				
Karnataka	43790	50075	524.12	35275
Season Total	43790	50075	524.12	35275
Rabi 2007-2008				
Rajasthan	584415	923775	9271.67	166334
Bihar	16158	16390	170.16	10510
Chhattisgarh	14371	26747	76.83	3632
Madhya Pradesh	12223	17641	180.42	5090
Season Total	**627167**	**984553**	**9699.08**	**185566**
Total	**670957**	**1034628**	**10223.19**	**220841**
Kharif 2008				
Madhya Pradesh	13563	12298	61.77	2777
Haryana	66	85	0.43	37
Punjab	17	95	0	0
Bihar	78110	86654	486.9	37635
Rajasthan	1749	2832	33.27	1217
Jharkhand	22157	14210	47.59	20843
Maharashtra	3025	4107	36.23	3025
Karnataka	25006	28955	275.72	20087
Orissa	13289	22278	414.81	13289
Tamil Nadu	8217	7141	83.1	5573
Season Total	**165199**	**178655**	**1439.83**	**104483**
Rabi 2008-09				
Haryana	329	720	8.67	189
Haryana	329	720	8.67	189
Bihar	137544	138544	2163.91	96940

Rajasthan	8405	28863	169.05	3635
Jharkhand	542	308	0.36	106
Karnataka	3621	6395	113.4	1632
Tamil Nadu	12727	10733	39.05	4980
Kerala	1068	1155	72.83	885
Chhattisgarh	208	516	20.62	208
West Bengal	2909	968	10.52	2823
Himachal Pradesh	630	88	12.58	630
Season Total	**167983**	**188290**	**2610.97**	**112028**
Total	**333182**	**366945**	**4050.8**	**216511**
Kharif 2009				
Bihar	396684	468292	5195.59	309908
Bihar	396684	468292	5195.59	309908
Rajasthan	299654	593286	3913.62	230105
Karnataka	99068	118299	1593.05	69877
Orissa	81429	113266	750.14	54811
Maharshtra	49832	59125	957.72	49832
Gujarat	140891	56356	662.81	120951
Madhya Pradesh	13506	17948	156.55	13506
Jharkhand	15926	7365	144.21	13109
Tamilnadu	9389	8606	90.56	2433
West Bengal	3947	2160	43.05	2643
Kerala	6684	4432	85.56	5200
Haryana	42	75	3.33	42
Andhra Pradesh	17303	11939	1734.23	16879
Season Total	**1134355**	**1461149**	**15330.43**	**889296**
Rabi 2009-10				
Bihar	380933	398903.5	5540.32	247410
Rajasthan	443912	734140.6	6752.41	184704
Karnataka	3037	8776.39	38.77	348
Madhya Pradesh	27884	70249.73	475.14	19576

Jharkhand	325	181.09	0.65	58
Tamilnadu	6699	6109	25.04	757
West Bengal	1941	901.76	54.53	1673
Kerala	1945	2496.23	89.34	399
Haryana	1742	3669	100	560
Andhra Pradesh	5	14.68	0	0
Himachal Pradesh	4929	1553	428.7	3678
Season Total	**873352**	**1226995**	**13504.9**	**459163**
Total	**2007707**	**2688144**	**28835.33**	**1348459**
Kharif 2010				
Andhra Pradesh	113710	121744.8	**	**
Bihar	194901	230378	*	194649
Chhatisgarh	372	693	3.34	281
Gujarat	132951	132951	58.84	5700
Haryana	4241	10585	194.26	1550
Jharkhand	30709	12929	**	**
Karnataka	37060	38117	**	**
Kerala	10456	6321	**	**
Maharashtra	394627	507729	*	345946
Madhya Pradesh	46390	122391	378.64	30591
Orissa	74734	101718	124.77	13924
Rajasthan	2830547	4689776	2799.54	643590
Tamilnadu	8344	7033	**	**
Uttarakhand	1153	532	100	960
Uttar Pradesh	9701	4523	*	2877
West Bengal	6296	4365	*	4876
Season Total	**3896192**	**5991786**	**3659.38**	**1244944**

*** : Figures are Claims approved. To be settled on receipt of State Govt's share of premium subsidy.**

**** : Figures are Claims are under process**

Source: Agricultural Insurance Company of India Limited, Chennai

Appendix -3: Statement Showing the Details of Claim Under WBCIS -Kharif 2009 in Tamil Nadu

Crop	Disrict Covered	No of farmers	Area in acre	Claims per acre	Claims payable	Farmers benefited
Banana	**Dharmapuri Total**	65	71.45	0	0	0
	Perambalur Total	12	26.95	1873	22382	6
	Salem Total	443	452.77	1528	33617	29
	Virudhunagar Total	11	18.78	0	0	0
Total		531	569.95	0	56000	35
Chillies	**Virudhunagar Total**	9	10.00	4925	49250	9
Total		9	10.00	0	49250	9
Cotton Irrigated	**Ariyalur Total**	2	2.00	771	1542	2
	Dharmapuri Total	15	33.61	586	293	1
	Perambalur Total	2	5.95	0	0	0
	Salem Total	7	6.61	0	0	0
	Virudhunagar Total	33	64.78	3171.5	253093	33
Total		59	112.95	0	254928	36
Cotton Rainfed	**Ariyalur Total**	10	17.00	873	18257	10
	Dharmapuri Total	4	9.00	0	0	0
	Perambalur Total	70	200.15	0	0	0
	Salem Total	41	168.32	1587	138894	20
	Virudhunagar Total	63	188.85	2243.5	160284	57
Total		188	583.32		317435	87
Cumbu	**Ariyalur Total**	1	1.00	0	0	0
Total		1	1.00	0	0	0
Groundnut	**Ariyalur Total**	10	26.80	1038.5	27172	10
	Dharmapuri Total	140	166.77	1728.2	217790	140
	Perambalur Total	25	57.20	367	20992	25
	Salem Total	122	220.34	911.6	152806	74
Total		297	471.11		418761	249
Maize	**Ariyalur Total**	26	911.6	152806	74	74
	Dharmapuri Total	10	4891	24455	10	10
	Perambalur Total	42	115.71	0	0	0
	Salem Total	85	158.26	0	0	0
	Virudhunagar Total	11	29.00	848	24752	11
Total		174	380.97		82707	47
Millets	**Ariyalur Total**	3	3.00	0	0	0
	Dharmapuri Total	34	35.50	1481	77996	34
	Salem Total	21	24.00	0	0	0
Total		58	62.50	0	77996	34
Onion	**Dharmapuri Total**	2	2.00	740	740	1
Total		2	2.00	0	740	1

Paddy I	**Ariyalur Total**	421	1338.44	0	0	0
	Dharmapuri Total	94	87.04	1607	60145	80
	Perambalur Total	989	2866.96	0	0	0
	Salem Total	75	181.47	0	0	0
	Perambalur Total	19	40.20	0	0	0
Total		1598	4514.11	0	60145	80
Paddy II	**Ariyalur Total**	1567	4471.45	1336.5	2832514	993
	Dharmapuri Total	301	639.95	4185	76878	15
	Perambalur Total	1455	3865.06	1336.5	575255	166
	Salem Total	437	775.57	1317.5	263191	62
	Virudhunagar Total	367	990.68	3085	2593896	227
Total		4127	10742.71	0	6341735	1463
Pulses	**Ariyalur Total**	1	1.00	0	0	0
	Dharmapuri Total	31	46.00	828	38088	31
	Salem Total	27	34.00	0	0	0
	Virudhunagar Total	1	7.00	608	4256	1
Total		60	88.00	0	42344	32
Sesame	**Ariyalur Total**	1	5.00	0	0	0
	Perambalur Total	1	4.00	0	0	0
	Salem Total	1	1.00	0	0	0
Total		3	10.00	0	0	0
Sunflower	**Ariyalur Total**	1	1.00	0	0	0
Total		1	1.00	0	0	0
Tapioca	**Dharmapuri Total**	169	164.07	5412.5	156013	19
	Salem Total	286	207.18	0	0	0
Total		455	371.25	0	174807	34
	Salem Total	11	14.74	2079	18794	15
Tomato Total		11	14.74	0	0	0
Turmeric	**Dharmapuri Total**	1015	1394.71	2521	695166	183
Grand	**Perambalur Total**	47	106.60	0	0	0
	Salem Total	753	2077.84	0	0	0
Total		1815	3579.15		1179086	326
Total		**9389**	**21514.76**		**9055933**	**2433**

Appendix -4 Premium Rate for different crops under WBCIS

Sl. No	Crop	Total premium (Inclusive of service Tax)	Share of Government Subsidy (Inclusive of Service Tax)	Farmer's Share (Inclusive of Service Tax)
1.	Paddy II	10.76%	8.55%	2.21%
2.	Millets (Other than Maize)	10.76%	8.00%	2.76%
3.	Maize	10.76%	8.00%	2.76%
4.	Groundnut	10.76%	6.89%	3.87%
5.	Pulses	10.76%	8.00%	2.76%
6.	Cotton	12.69%	6.07%	6.62%
7.	Vegetables- onion, Tomato & Chillies, Brijal, Vindi and others	12.69%	6.07%	6.62%

Source: Agricultural Insurance Company of India Limited, Chennai

Appendix -5 Crop Loss Assessment method followed in Weather Based Crop Insurance Scheme for Paddy

1.1 Maximum Sum Insured Per Acre

Weather peril	**Sum Insured (in Rs.)**
Defecit Rainfall Cover	3000
Excess Rainfall Cover	5000
Consecutive Dry Days Cover	2000
Maximum Sum Insured per Acre	10000

Table 1 : Insured per Acre

Details of Phasewise weather perils Covered	Phase 1	Phase 2	Phase 3
	15th August- 3rd October 2010	**4th October – 12th November 2010**	**13th November – 22nd December 2010**
Defecit Rainfall Cover	Covered	Covered	Covered
Excess Rainfall Cover	Covered	Covered	Covered
Consecutive Dry Days Cover	15th September – 14th November 2010		

Table 2 Deficit Rainfall Cover

Index	When Phase wise Cumulative Rainfall is less than specified strike value		
Phase Covered	Phase 1	Phase 2	Phase 3
Covered Period	15th August- 3rd October 2010	4th October – 12th November 2010	13th November – 22nd December 2010
Rainfall Strike 1 (in mm)	Rainfall less than 90 mm and greater than 45 mm	Rainfall less than 160 mm and greater than 80 mm	Rainfall less than 50 mm and greater than 25 mm
Rainfall Strike 2 (in mm)	Rainfall equal or less than 45 mm	Rainfall equal or less than 80 mm	Rainfall equal or less than 25 mm
Payout Calculation Formula	(Respective Strike/s – Actual rainfall of a phase)* National (To be calculated Separately for each phase)		
National for Strike 1 per mm	Rs 5		
National for Strike 2 per mm	Rs 15		
Maximum Payout Under Deficit Rainfall (In Rs)	3000		

Table 3 Excess Rainfall Cover

Index	**When Phase wise Cumulative Rainfall of any two consecutive days in a phase is more than specified strike value**		
Phase Covered	Phase 1	Phase 2	Phase 3
Covered Period	15th August- 3rd October 2010	4th October – 12th November 2010	13th November – 22nd December 2010
Strike (in mm)	100	125	150
Daily Rainfall cap (in mm)	250	250	250
Payout Calculation Formula	Where ERC= (cumulative rainfall of any 2 consecutive days- strike) Aggregate of all Excess Rainfall Counts (ERC)* National		
National per mm	Rs 5		
Maximum Payout Under Deficit Rainfall (In Rs)	5000		

Table 4 Consecutive Dray Days Cover

Index	**No of Consecutive dry days with Rainfall less than 2.5 mm**					
Cover Period	15th September to 14 November 2010					
Pay out calculation						
Strike (No of Consecutive dry days)	Greater than or equal to 28 days	Greater than or equal to 35 days	Greater than or equal to 40 days	Greater than or equal to 46 days	Greater than or equal to 52 days	Greater than or equal to 56 days
Claim Payout (in Rs)	160	600	1000	1400	1600	2000
Maximum payout under consecutive dry days cover (in Rs)	2000					

Table 5 Sum insured Premium and Franchise

Max Sum Insured per Acre (Defecit Rainfall Cover+ Excess Rainfall Cover + Consecutive Dry days Cover)	Rs 10000
Actual Payout in Rs	Payout of Defecit Rainfall Cover+ Payout of Excess Rainfall Cover + Payout of Consecutive Dry days Cover
Policy Franchise per Acre	Rs 400
Total premium Per Acre (Exclusive of Service tax)	Rs 975
Premium payable by the Farmer per Acre (Exclusive of Service tax)	Rs200

Important points:

For Deficit Rainfall Cover: In a phase of there are 2 strikes then assessment of a claim, if any will be done on the basis of both strike as applicable, if required. For example:

	Case	Rainfall	Payout Calculation
Phase 2	Case 1	60 mm	(90-60)*5= 150 Rs
			First 30 mm deficit * Notional 1
	Case 2	20 mm	(90-45)*5+(45-20)*15= 600 Rs
			First 45 mm deficit * Notional 1+ Remaining 25 mm deficit * Notional 2
	Case 3	0 mm	(90-45)*5+(45-0)*15= 900 Rs
			First 45 mm deficit * Notional 1+ Remaining 45 mm deficit * National 2

For Excess Rainfall Cover:

If the rainfall of any day triggers an excess rainfall count along with the previous day, then rainfall of that particular say will not be considered again along with next subsequent day for calculating Excess Rainfall Count. For example: if cumulative rainfall on Aug 25 has already resulted in 2 days cumulative Excess Rainfall on Aug 24 and 25; then it will not be taken into account again for Aug 25 and 26.

Rainfall counting may continue from one phase to next subsequent phase and strike of subsequent phase will be applicable. For example: if cumulative rainfall of the last day of phase 1 (i. e. Oct 3) and the first day of phase 2 (i.e. October 4) exceeds strike phase2, then Excess Rainfall Count (ERC) will be considered.

WBCIS is not linked to declaration of drought or flood by any state or agency

Term	Definition
National	Amount to be paid per MM
Strike	Threshold level above which payout/calim s calculated
Policy Franchise	If actual payout is greater than policy Franchise, then actual payout will be payable. But actual Payout is less than policy Franchise, Actual payout payable will be Nill.
Daily Rainfall Cap	Maximum Rainfall Value (in mm) to be considered in a single day. Rainfall value above the specified daily rainfall cap will not be considered.

Source: Agricultural Insurance Company of India Limited, Chennai

Appendix -6 Crop Loss Assessment method followed in Weather Based Crop Insurance Scheme for Groundnut

Maximum Sum Insured Per Acre

Weather peril	**Sum Insured (in Rs.)**
Defecit Rainfall Cover	2500
Excess Rainfall Cover	5500
Consecutive Dry Days Cover	2000
Maximum Sum Insured per Acre	10000

Table 1:

Details of Phasewise weather perils Covered	**Phase 1**	**Phase 2**	**Phase 3**	**Phase 4**
	1st August- 9th September 2010	**10th September – 29th October 2010**	**30th October – 8th December 2010**	**9th December – 31st December 2010**
Defecit Rainfall Cover	Covered	Covered	Covered	Not Covered
Excess Rainfall Cover	Covered	Covered	Covered	Covered
Consecutive Dry Days Cover	1st September – 31st October 2010			

Table 2 :Deficit Rainfall Cover

Index	**When Phase wise Cumulative Rainfall is less than specified strike value**		
Phase Covered	Phase 1	Phase 2	Phase 3
Covered Period	1st August- 9th September 2010	10th September – 29th October 2010	30th October – 8th December 2010
Rainfall Strike (in mm)	Rainfall less than 40 mm	Rainfall less than 80 mm	Rainfall less than 80 mm
Payout Calculation Formula	(Respective Strike/s – Actual rainfall of a phase)* National (To be calculated Separately for each phase)		
National for Strike per mm	Rs 12.5		
Maximum Payout Under Deficit Rainfall (In Rs)	2500		

Table 3: Excess Rainfall Cover

Index	**When Phase wise Cumulative Rainfall of any two consecutive days in a phase is more than specified strike value**			
Phase Covered	Phase 1	Phase 2	Phase 3	Phase 4
Covered Period	1st August- 9th September 2010	10th September – 29th October 2010	30th October – 8th December 2010	9th December – 31st December 2010
Strike (in mm)	100	125	150	75
Daily Rainfall cap (in mm)	250	250	250	250
Payout Calculation Formula	Where ERC= (cumulative rainfall of any 2 consecutive days- strike) Aggregate of all Excess Rainfall Counts (ERC)* National			
National per mm	Rs 5			
Maximum Payout Under Deficit Rainfall (In Rs)	5500			

Table 4 : Consecutive Dray Days Cover

Index	**No of Consecutive dry days with Rainfall less than 2.5 mm**					
Cover Period	1st September to 31st October 2010					
Pay out calculation						
Strike (No of Consecutive dry days)	Greater than or equal to 28 days	Greater than or equal to 35 days	Greater than or equal to 40 days	Greater than or equal to 46 days	Greater than or equal to 52 days	Greater than or equal to 56 days
Claim Payout (in Rs)	160	600	1000	1400	1600	2000
Maximum payout under consecutive dry days cover (in Rs)	2000					

Table 5: Sum insured Premium and Franchise

Max Sum Insured per Acre (Defecit Rainfall Cover+ Excess Rainfall Cover + Consecutive Dry days Cover)	Rs 10000
Actual Payout in Rs	Payout of Defecit Rainfall Cover+ Payout of Excess Rainfall Cover + Payout of Consecutive Dry days Cover
Policy Franchise per Acre	Rs 450
Total premium Per Acre (Exclusive of Service tax)	Rs 975
Premium payable by the Farmer per Acre (Exclusive of Service tax)	Rs350

For Excess Rainfall Cover:

If the rainfall of any day triggers an excess rainfall count along with the previous day, then rainfall of that particular say will not be considered again along with next subsequent day for calculating Excess Rainfall Count. For example: if cumulative rainfall on Aug 15 has already resulted in 2 days cumulative Excess Rainfall on Aug 14 and 15; then it will not be taken into account again for Aug 15 and 16.

Rainfall counting may continue from one phase to next subsequent phase and strike of subsequent phase will be applicable. For example: if cumulative rainfall of the last day of phase 1 (i. e. Oct 9) and the first day of phase 2 (i.e. October 10) exceeds strike phase 2, then Excess Rainfall Count (ERC) will be considered.

WBCIS is not linked to declaration of drought or flood by any state or agency

Term	**Definition**
National	Amount to be paid per MM
Strike	Threshold level above which payout/calim s calculated
Policy Franchise	If actual payout is greater than policy Franchise, then actual payout will be payable. But actual Payout is less than policy Franchise, Actual payout payable will be Nill.
Daily Rainfall Cap	Maximum Rainfall Value (in mm) to be considered in a single day. Rainfall value above the specified daily rainfall cap will not be considered.

Source: Agricultural Insurance Company of India Limited, Chennai

Salem District map Showing Selected Blocks

Tamil Nadu

Salem District

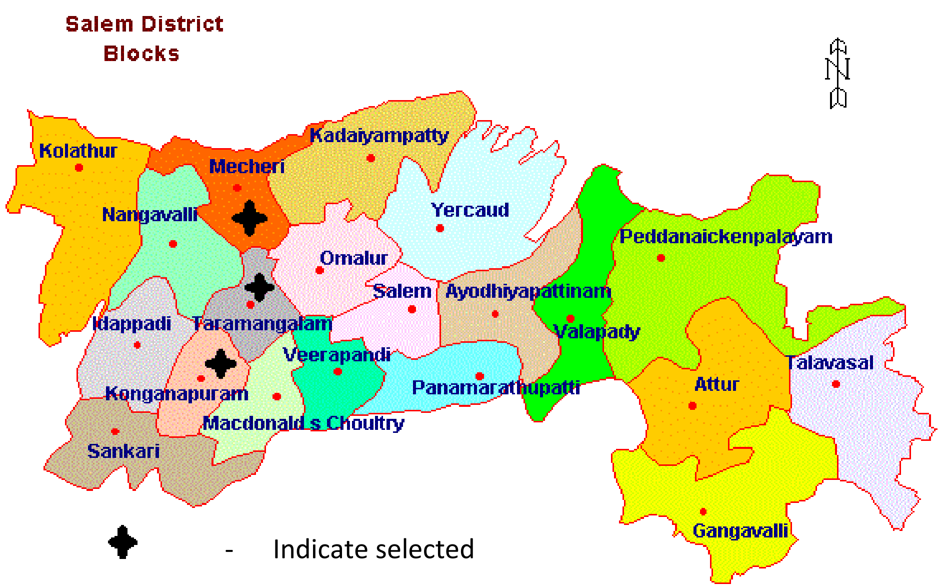

Fig 3.1 Map showing the study area in Salem district

Appendix -1. Crops Covered Under Kharif and Rabi Seasons In WBCIS

S.No.	Food crops & Oilseeds	Annual commercial /Annual Horticulture Crops	Food crops & Oilseeds	Annual commercial /Annual Horticulture Crops
1	Bajra	Chilly	Barley	Cashew nut
2	Blackgram	Cotton	Bengal gram	Chilly
3	Greengram	Onion	Chick pea	Coriander
4	Groundnut	Tomato	Gram	Cotton
5	Jowar	Orange	Groundnut	Cumin
6	Maize	banana	Jowar	Grapes
7	Paddy		Lentil	Isabgol
8	Pigeon Pea		Linseed	Mango
9	Ragi		Maize	Methi
10	Sesamum		Paddy	Onion
11	Soyabean		Rape & Mustard	Potato
12	Sunflower		Sesamum	Tomato
13	Tur		Sunflower	Kinnu
14	Moth		Wheat	Amla
15	Guar			Gherkin

Source: Agricultural Insurance Company of India Limited, Chennai

Appendix -2: State/Season-wise Farmers Covered and Benefited, Area Covered and Claims Settled under Pilot Weather Based Crop Insurance Scheme in India

(2007-2008 to 2009-2010)

States/Season	Farmers Covered	Area (Ha)	Claims Settled (Rs. in Lakh)	Farmers Benefitted
Kharif 2007				
Karnataka	43790	50075	524.12	35275
Season Total	43790	50075	524.12	35275
Rabi 2007-2008				
Rajasthan	584415	923775	9271.67	166334
Bihar	16158	16390	170.16	10510
Chhattisgarh	14371	26747	76.83	3632
Madhya Pradesh	12223	17641	180.42	5090
Season Total	**627167**	**984553**	**9699.08**	**185566**
Total	**670957**	**1034628**	**10223.19**	**220841**
Kharif 2008				
Madhya Pradesh	13563	12298	61.77	2777
Haryana	66	85	0.43	37
Punjab	17	95	0	0
Bihar	78110	86654	486.9	37635
Rajasthan	1749	2832	33.27	1217
Jharkhand	22157	14210	47.59	20843
Maharashtra	3025	4107	36.23	3025
Karnataka	25006	28955	275.72	20087
Orissa	13289	22278	414.81	13289
Tamil Nadu	8217	7141	83.1	5573
Season Total	**165199**	**178655**	**1439.83**	**104483**
Rabi 2008-09				
Haryana	329	720	8.67	189
Haryana	329	720	8.67	189
Bihar	137544	138544	2163.91	96940

Rajasthan	8405	28863	169.05	3635
Jharkhand	542	308	0.36	106
Karnataka	3621	6395	113.4	1632
Tamil Nadu	12727	10733	39.05	4980
Kerala	1068	1155	72.83	885
Chhattisgarh	208	516	20.62	208
West Bengal	2909	968	10.52	2823
Himachal Pradesh	630	88	12.58	630
Season Total	**167983**	**188290**	**2610.97**	**112028**
Total	**333182**	**366945**	**4050.8**	**216511**
Kharif 2009				
Bihar	396684	468292	5195.59	309908
Bihar	396684	468292	5195.59	309908
Rajasthan	299654	593286	3913.62	230105
Karnataka	99068	118299	1593.05	69877
Orissa	81429	113266	750.14	54811
Maharshtra	49832	59125	957.72	49832
Gujarat	140891	56356	662.81	120951
Madhya Pradesh	13506	17948	156.55	13506
Jharkhand	15926	7365	144.21	13109
Tamilnadu	9389	8606	90.56	2433
West Bengal	3947	2160	43.05	2643
Kerala	6684	4432	85.56	5200
Haryana	42	75	3.33	42
Andhra Pradesh	17303	11939	1734.23	16879
Season Total	**1134355**	**1461149**	**15330.43**	**889296**
Rabi 2009-10				
Bihar	380933	398903.5	5540.32	247410
Rajasthan	443912	734140.6	6752.41	184704
Karnataka	3037	8776.39	38.77	348
Madhya Pradesh	27884	70249.73	475.14	19576

Jharkhand	325	181.09	0.65	58
Tamilnadu	6699	6109	25.04	757
West Bengal	1941	901.76	54.53	1673
Kerala	1945	2496.23	89.34	399
Haryana	1742	3669	100	560
Andhra Pradesh	5	14.68	0	0
Himachal Pradesh	4929	1553	428.7	3678
Season Total	**873352**	**1226995**	**13504.9**	**459163**
Total	**2007707**	**2688144**	**28835.33**	**1348459**
Kharif 2010				
Andhra Pradesh	113710	121744.8	**	**
Bihar	194901	230378	*	194649
Chhatisgarh	372	693	3.34	281
Gujarat	132951	132951	58.84	5700
Haryana	4241	10585	194.26	1550
Jharkhand	30709	12929	**	**
Karnataka	37060	38117	**	**
Kerala	10456	6321	**	**
Maharashtra	394627	507729	*	345946
Madhya Pradesh	46390	122391	378.64	30591
Orissa	74734	101718	124.77	13924
Rajasthan	2830547	4689776	2799.54	643590
Tamilnadu	8344	7033	**	**
Uttarakhand	1153	532	100	960
Uttar Pradesh	9701	4523	*	2877
West Bengal	6296	4365	*	4876
Season Total	**3896192**	**5991786**	**3659.38**	**1244944**

*** : Figures are Claims approved. To be settled on receipt of State Govt's share of premium subsidy.**

**** : Figures are Claims are under process**

Source: Agricultural Insurance Company of India Limited, Chennai

Appendix -3: Statement Showing the Details of Claim Under WBCIS -Kharif 2009 in Tamil Nadu

Crop	Disrict Covered	No of farmers	Area in acre	Claims per acre	Claims payable	Farmers benefited
Banana	**Dharmapuri Total**	65	71.45	0	0	0
	Perambalur Total	12	26.95	1873	22382	6
	Salem Total	443	452.77	1528	33617	29
	Virudhunagar Total	11	18.78	0	0	0
Total		531	569.95	0	56000	35
Chillies	**Virudhunagar Total**	9	10.00	4925	49250	9
Total		9	10.00	0	49250	9
Cotton Irrigated	**Ariyalur Total**	2	2.00	771	1542	2
	Dharmapuri Total	15	33.61	586	293	1
	Perambalur Total	2	5.95	0	0	0
	Salem Total	7	6.61	0	0	0
	Virudhunagar Total	33	64.78	3171.5	253093	33
Total		59	112.95	0	254928	36
Cotton Rainfed	**Ariyalur Total**	10	17.00	873	18257	10
	Dharmapuri Total	4	9.00	0	0	0
	Perambalur Total	70	200.15	0	0	0
	Salem Total	41	168.32	1587	138894	20
	Virudhunagar Total	63	188.85	2243.5	160284	57
Total		188	583.32		317435	87
Cumbu	**Ariyalur Total**	1	1.00	0	0	0
Total		1	1.00	0	0	0
Groundnut	**Ariyalur Total**	10	26.80	1038.5	27172	10
	Dharmapuri Total	140	166.77	1728.2	217790	140
	Perambalur Total	25	57.20	367	20992	25
	Salem Total	122	220.34	911.6	152806	74
Total		297	471.11		418761	249
Maize	**Ariyalur Total**	26	911.6	152806	74	74
	Dharmapuri Total	10	4891	24455	10	10
	Perambalur Total	42	115.71	0	0	0
	Salem Total	85	158.26	0	0	0
	Virudhunagar Total	11	29.00	848	24752	11
Total		174	380.97		82707	47
Millets	**Ariyalur Total**	3	3.00	0	0	0
	Dharmapuri Total	34	35.50	1481	77996	34
	Salem Total	21	24.00	0	0	0
Total		58	62.50	0	77996	34
Onion	**Dharmapuri Total**	2	2.00	740	740	1
Total		2	2.00	0	740	1

Paddy I	**Ariyalur Total**	421	1338.44	0	0	0
	Dharmapuri Total	94	87.04	1607	60145	80
	Perambalur Total	989	2866.96	0	0	0
	Salem Total	75	181.47	0	0	0
	Perambalur Total	19	40.20	0	0	0
Total		1598	4514.11	0	60145	80
Paddy II	**Ariyalur Total**	1567	4471.45	1336.5	2832514	993
	Dharmapuri Total	301	639.95	4185	76878	15
	Perambalur Total	1455	3865.06	1336.5	575255	166
	Salem Total	437	775.57	1317.5	263191	62
	Virudhunagar Total	367	990.68	3085	2593896	227
Total		4127	10742.71	0	6341735	1463
Pulses	**Ariyalur Total**	1	1.00	0	0	0
	Dharmapuri Total	31	46.00	828	38088	31
	Salem Total	27	34.00	0	0	0
	Virudhunagar Total	1	7.00	608	4256	1
Total		60	88.00	0	42344	32
Sesame	**Ariyalur Total**	1	5.00	0	0	0
	Perambalur Total	1	4.00	0	0	0
	Salem Total	1	1.00	0	0	0
Total		3	10.00	0	0	0
Sunflower	**Ariyalur Total**	1	1.00	0	0	0
Total		1	1.00	0	0	0
Tapioca	**Dharmapuri Total**	169	164.07	5412.5	156013	19
	Salem Total	286	207.18	0	0	0
Total		455	371.25	0	174807	34
	Salem Total	11	14.74	2079	18794	15
Tomato Total		11	14.74	0	0	0
Turmeric	**Dharmapuri Total**	1015	1394.71	2521	695166	183
Grand	**Perambalur Total**	47	106.60	0	0	0
	Salem Total	753	2077.84	0	0	0
Total		1815	3579.15		1179086	326
Total		**9389**	**21514.76**		**9055933**	**2433**

Appendix -4 Premium Rate for different crops under WBCIS

Sl. No	Crop	Total premium (Inclusive of service Tax)	Share of Government Subsidy (Inclusive of Service Tax)	Farmer's Share (Inclusive of Service Tax)
1.	Paddy II	10.76%	8.55%	2.21%
2.	Millets (Other than Maize)	10.76%	8.00%	2.76%
3.	Maize	10.76%	8.00%	2.76%
4.	Groundnut	10.76%	6.89%	3.87%
5.	Pulses	10.76%	8.00%	2.76%
6.	Cotton	12.69%	6.07%	6.62%
7.	Vegetables- onion, Tomato & Chillies, Brijal, Vindi and others	12.69%	6.07%	6.62%

Source: Agricultural Insurance Company of India Limited, Chennai

Appendix -5 Crop Loss Assessment method followed in Weather Based Crop Insurance Scheme for Paddy

1.1 Maximum Sum Insured Per Acre

Weather peril	**Sum Insured (in Rs.)**
Defecit Rainfall Cover	3000
Excess Rainfall Cover	5000
Consecutive Dry Days Cover	2000
Maximum Sum Insured per Acre	10000

Table 1 : Insured per Acre

Details of Phasewise weather perils Covered	**Phase 1**	**Phase 2**	**Phase 3**
	15th August- 3rd October 2010	**4th October – 12th November 2010**	**13th November – 22nd December 2010**
Defecit Rainfall Cover	Covered	Covered	Covered
Excess Rainfall Cover	Covered	Covered	Covered
Consecutive Dry Days Cover	15th September – 14th November 2010		

Table 2 Deficit Rainfall Cover

Index	**When Phase wise Cumulative Rainfall is less than specified strike value**		
Phase Covered	Phase 1	Phase 2	Phase 3
Covered Period	15th August- 3rd October 2010	4th October – 12th November 2010	13th November – 22nd December 2010
Rainfall Strike 1 (in mm)	Rainfall less than 90 mm and greater than 45 mm	Rainfall less than 160 mm and greater than 80 mm	Rainfall less than 50 mm and greater than 25 mm
Rainfall Strike 2 (in mm)	Rainfall equal or less than 45 mm	Rainfall equal or less than 80 mm	Rainfall equal or less than 25 mm
Payout Calculation Formula	(Respective Strike/s – Actual rainfall of a phase)* National (To be calculated Separately for each phase)		
National for Strike 1 per mm	Rs 5		
National for Strike 2 per mm	Rs 15		
Maximum Payout	3000		

Under Deficit Rainfall (In Rs)	

Table 3 Excess Rainfall Cover

Index	**When Phase wise Cumulative Rainfall of any two consecutive days in a phase is more than specified strike value**		
Phase Covered	Phase 1	Phase 2	Phase 3
Covered Period	15th August- 3rd October 2010	4th October – 12th November 2010	13th November – 22nd December 2010
Strike (in mm)	100	125	150
Daily Rainfall cap (in mm)	250	250	250
Payout Calculation Formula	Where ERC= (cumulative rainfall of any 2 consecutive days- strike) Aggregate of all Excess Rainfall Counts (ERC)* National		
National per mm	Rs 5		
Maximum Payout Under Deficit Rainfall (In Rs)	5000		

Table 4 Consecutive Dray Days Cover

Index	**No of Consecutive dry days with Rainfall less than 2.5 mm**					
Cover Period	15th September to 14 November 2010					
Pay out calculation						
Strike (No of Consecutive dry days)	Greater than or equal to 28 days	Greater than or equal to 35 days	Greater than or equal to 40 days	Greater than or equal to 46 days	Greater than or equal to 52 days	Greater than or equal to 56 days
Claim Payout (in Rs)	160	600	1000	1400	1600	2000
Maximum payout under consecutive dry days cover (in Rs)	2000					

Table 5 Sum insured Premium and Franchise

Max Sum Insured per Acre (Defecit Rainfall Cover+ Excess Rainfall Cover + Consecutive Dry days Cover)	Rs 10000
Actual Payout in Rs	Payout of Defecit Rainfall Cover+ Payout of Excess Rainfall Cover + Payout of Consecutive Dry days Cover
Policy Franchise per Acre	Rs 400
Total premium Per Acre (Exclusive of Service tax)	Rs 975

Premium payable by the Farmer per Acre (Exclusive of Service tax)	Rs200

Important points:

For Deficit Rainfall Cover: In a phase of there are 2 strikes then assessment of a claim, if any will be done on the basis of both strike as applicable, if required. For example:

<table>
<tr><th></th><th>Case</th><th>Rainfall</th><th>Payout Calculation</th></tr>
<tr><td rowspan="6">Phase 2</td><td rowspan="2">Case 1</td><td rowspan="2">60 mm</td><td>(90-60)*5= 150 Rs</td></tr>
<tr><td>First 30 mm deficit * Notional 1</td></tr>
<tr><td rowspan="2">Case 2</td><td rowspan="2">20 mm</td><td>(90-45)*5+(45-20)*15= 600 Rs</td></tr>
<tr><td>First 45 mm deficit * Notional 1+ Remaining 25 mm deficit * Notional 2</td></tr>
<tr><td rowspan="2">Case 3</td><td rowspan="2">0 mm</td><td>(90-45)*5+(45-0)*15= 900 Rs</td></tr>
<tr><td>First 45 mm deficit * Notional 1+ Remaining 45 mm deficit * National 2</td></tr>
</table>

For Excess Rainfall Cover:

If the rainfall of any day triggers an excess rainfall count along with the previous day, then rainfall of that particular say will not be considered again along with next subsequent day for calculating Excess Rainfall Count. For example: if cumulative rainfall on Aug 25 has already resulted in 2 days cumulative Excess Rainfall on Aug 24 and 25; then it will not be taken into account again for Aug 25 and 26.

Rainfall counting may continue from one phase to next subsequent phase and strike of subsequent phase will be applicable. For example: if cumulative rainfall of the last day of phase 1 (i. e. Oct 3) and the first day of phase 2 (i.e. October 4) exceeds strike phase2, then Excess Rainfall Count (ERC) will be considered.

WBCIS is not linked to declaration of drought or flood by any state or agency

Term	Definition
National	Amount to be paid per MM
Strike	Threshold level above which payout/calim s calculated
Policy Franchise	If actual payout is greater than policy Franchise, then actual payout will be payable. But actual Payout is less than policy Franchise, Actual payout payable will be Nill.
Daily Rainfall Cap	Maximum Rainfall Value (in mm) to be considered in a single day. Rainfall value above the specified daily rainfall cap will not be considered.

Source: Agricultural Insurance Company of India Limited, Chennai

Appendix -6 Crop Loss Assessment method followed in Weather Based Crop Insurance Scheme for Groundnut

Maximum Sum Insured Per Acre

Weather peril	Sum Insured (in Rs.)
Defecit Rainfall Cover	2500
Excess Rainfall Cover	5500
Consecutive Dry Days Cover	2000
Maximum Sum Insured per Acre	10000

Table 1:

Details of Phasewise weather perils Covered	Phase 1	Phase 2	Phase 3	Phase 4
	1st August- 9th September 2010	10th September – 29th October 2010	30th October – 8th December 2010	9th December – 31st December 2010
Defecit Rainfall Cover	Covered	Covered	Covered	Not Covered
Excess Rainfall Cover	Covered	Covered	Covered	Covered
Consecutive Dry Days Cover	1st September – 31st October 2010			

Table 2 :Deficit Rainfall Cover

Index	When Phase wise Cumulative Rainfall is less than specified strike value		
Phase Covered	Phase 1	Phase 2	Phase 3
Covered Period	1st August- 9th September 2010	10th September – 29th October 2010	30th October – 8th December 2010
Rainfall Strike (in mm)	Rainfall less than 40 mm	Rainfall less than 80 mm	Rainfall less than 80 mm
Payout Calculation Formula	(Respective Strike/s – Actual rainfall of a phase)* National (To be calculated Separately for each phase)		
National for Strike per mm	Rs 12.5		
Maximum Payout Under Deficit Rainfall (In Rs)	2500		

Table 3: Excess Rainfall Cover

Index	When Phase wise Cumulative Rainfall of any two consecutive days in a phase is more than specified strike value			
Phase Covered	Phase 1	Phase 2	Phase 3	Phase 4
Covered Period	1st August- 9th September 2010	10th September – 29th October 2010	30th October – 8th December 2010	9th December – 31st December 2010
Strike (in mm)	100	125	150	75
Daily Rainfall cap (in mm)	250	250	250	250
Payout Calculation Formula	Where ERC= (cumulative rainfall of any 2 consecutive days- strike) Aggregate of all Excess Rainfall Counts (ERC)* National			
National per mm	Rs 5			
Maximum Payout Under Deficit Rainfall (In Rs)	5500			

Table 4 : Consecutive Dray Days Cover

Index	No of Consecutive dry days with Rainfall less than 2.5 mm					
Cover Period	1st September to 31st October 2010					
Pay out calculation						
Strike (No of Consecutive dry days)	Greater than or equal to 28 days	Greater than or equal to 35 days	Greater than or equal to 40 days	Greater than or equal to 46 days	Greater than or equal to 52 days	Greater than or equal to 56 days
Claim Payout (in Rs)	160	600	1000	1400	1600	2000
Maximum payout under consecutive dry days cover (in Rs)	2000					

Table 5: Sum insured Premium and Franchise

Max Sum Insured per Acre (Defecit Rainfall Cover+ Excess Rainfall Cover + Consecutive Dry days Cover)	Rs 10000
Actual Payout in Rs	Payout of Defecit Rainfall Cover+ Payout of Excess Rainfall Cover + Payout of Consecutive Dry days Cover
Policy Franchise per Acre	Rs 450
Total premium Per Acre (Exclusive of Service tax)	Rs 975
Premium payable by the Farmer per Acre (Exclusive of Service tax)	Rs350

For Excess Rainfall Cover:

If the rainfall of any day triggers an excess rainfall count along with the previous day, then rainfall of that particular say will not be considered again along with next subsequent day for calculating Excess Rainfall Count. For example: if cumulative rainfall on Aug 15 has already resulted in 2 days cumulative Excess Rainfall on Aug 14 and 15; then it will not be taken into account again for Aug 15 and 16.

Rainfall counting may continue from one phase to next subsequent phase and strike of subsequent phase will be applicable. For example: if cumulative rainfall of the last day of phase 1 (i. e. Oct 9) and the first day of phase 2 (i.e. October 10) exceeds strike phase 2, then Excess Rainfall Count (ERC) will be considered.

WBCIS is not linked to declaration of drought or flood by any state or agency

Term	**Definition**
National	Amount to be paid per MM
Strike	Threshold level above which payout/calim s calculated
Policy Franchise	If actual payout is greater than policy Franchise, then actual payout will be payable. But actual Payout is less than policy Franchise, Actual payout payable will be Nill.
Daily Rainfall Cap	Maximum Rainfall Value (in mm) to be considered in a single day. Rainfall value above the specified daily rainfall cap will not be considered.

Source: Agricultural Insurance Company of India Limited, Chennai