RAINFALL INSURANCE IN INDIA:
DOES IT DEAL WITH RISKS IN DRYLAND FARMING? [1]

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Abstract

Rainfall continues to be a major risk confronted by the dryland farmers in semi-arid tropics of India. Through the years, dryland farmers experience an increasingly erratic rainfall and frequent occurrence of droughts. Crop yield and farm income are highly correlated with quantum and distribution of rainfall thereby livelihoods of resource poor farmer are at risk. Rainfall insurance, a type of Weather Based Crop Insurance Scheme (WBCIS), was introduced as a risk covering mechanism to extreme rainfall events and to reduce hassles in operationalization of other crop insurance schemes. This study documents rainfall insurance scheme and its operational modalities such as eligibility criteria, payment of premium, benefit structure and payouts, and technical hassles. It examined the hypothesis that low spread of rainfall insurance was linked with the situation where prospective buyers were unable to relate the product to their regular exposure. This study also underlines incongruity comparing the variation in longitudinal actual village data and reference weather data (mandal level[3]) that were used to calculate strike, exit and payouts to the farmers across six villages of semi-arid tropics (SAT) region. It identified several challenges on the ground in its capacity to cover risk among the farmers. The challenges include lack of proper awareness among farmers, absence of reliable weather datasets, misinformation on insurance contract and processes, exclusion of high risky crops from the

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[1] Paper presented at the 8th Conference of the Asian Society of Agricultural Economists (ASAE) held on 15-17 October 2014 at the BRAC Centre for Development Management (BRAC-CDM), Savar, Dhaka, Bangladesh.
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[3] Mandal is the sub-district administrative level in the state of Telangana, India

rainfall insurance coverage. Real time calculation of risk benefits with existing policy found that existing design cannot appropriate to meet the loss, if incurred during the climate extremes. Hence, there is a need to relook at the insurance policy design in terms of efficiency. The study also argued that with continuous government support and by drawing on both quasi government and private players into the process for greater transparency and design to improve effectiveness of this initiative.

Key words: WBCIS, Rainfall Insurance, risk management, semi-arid tropics, dryland farming, India.

1. INTRODUCTION

The semi-arid tropical environment in India is highly vulnerable in terms of weather risks and it expects to further exacerbate in the future. The global climate models have predicted the frequent incidences of extreme events such as drought, flood etc. and with increased weather variability in the region (IPCC, 2013). Hence, steps towards improving the adaptive capacity of rural farmers to climate risks are crucial in the semi-arid region of the world. The consequences of risk will result in crop income reduction, selling of assets such as, livestock, land, in order to smoothen consumption expenditure (Bantilan and Anupama, 2006; Bidinger et al. 1991). Furthermore, this anticipation of losses also affects household behavior, causing farmers that are unprotected to avoid investment, innovation and risk taking (Hill, 2009) and underinvest in high return, but also in high volatility projects, limiting household ability to grow out of poverty (Dercon and Christiansen, 2007). Hence, farmers' should be equipped with the capacity to absorb these losses in the future (Larson et al., 2004). Sufficient support should be provided through different policies and safety net programs that prevent further deterioration of poverty levels from the

impacts of climatic risks. Therefore, investigating on current options and to understand the risk-coping potential is necessary.

The agricultural insurance is considered an important mechanism to effectively address the risk resulting from unfavorable natural events (Bakker, 1990; Raju and Chand, 2007). This envisioned as means of protecting the farmers against financial losses due to uncertainties and agricultural losses arising from all unforeseen perils beyond their control. Agricultural insurance aid farmers to stabilize farm income and investment and it guard against financial losses due to natural hazards. The agricultural insurance includes such as crop insurance, weather based insurances that are operational in the region. Farmers participating in a crop insurance scheme pay a premium each year and in which yields per hectare are below a certain level, indemnities are paid to the farmer. An insurance payout is triggered if measured crop yields from the area fall below a certain threshold, based on crop cutting experiments conducted on a sample of monitored selected plots. However, there are several operational constraints in crop insurance including limitations in product design, the procedural complexities in assessment of loss, high administrative cost, inaccurate assessment of loss and inappropriate compensation to losses depending on crops (Gine et al. 2008; AFC, 2011). This has led in devising weather based crop insurance to insure participants (farmers) against unfavorable weather events such as rainfall insurance. Weather based Crop Insurance uses weather parameters as 'proxy' for crop yields in compensating the cultivators for deemed crop losses. In the rainfall insurance the volume of indemnity paid back to insured farmer only depends on the weather variable. It is different from crop insurance as it is based on the fact that weather conditions affect crop production even when a cultivator has taken all the care to ensure good harvest.

Broad objective of the study is to understand effectiveness of the rainfall insurance scheme in dryland regions in India. Specific objectives of the study are: (a) to review the operational modalities of the rainfall insurance scheme in India such as eligibility criteria, payment of premium, benefit structure and payouts, and technical hassles; (b) to compute and compare rainfall index at various administrative level i.e. District, Mandal and Village level; and (c) to analyze the risk minimizing ability, effectiveness and constraints in implementation of the rainfall insurance.

The paper is structured as follows. After this introductory section, Section 2 describes the approach followed in this study. Comprehensive review of existing knowledge about the rainfall insurance scheme particularly its design, operational modalities, process and distribution of the scheme is provided in Section 3. Section 4 details out the rainfall insurance scheme, experience of the insured farmers and puts forward some suggestions for improvement of the rainfall insurance scheme. Conclusions are provided in the last section.

2. THE STUDY APPROACH

The study includes extensive review of research literatures on rainfall insurance scheme carried out in the region. The information on the operational modalities of the rainfall insurance was collected through key informants' interview from the insurance provider organization (Agricultural Insurance Company of India), stakeholders (farmers) and facilitating organization (microfinance institute). With an aim to understand ground level working of rainfall insurance, primary data were collected from Dharmapur village of Mahbubnagar district of Telangana state of India. The main aim was to know the perception, awareness and extent of benefits accrued by farming community, who availed weather based crop insurance scheme (WBCIS), rainfall insurance in this case among different farm group. Long term weather data analysis was carried

out using data collected by ICRISAT through its village level studies (VLS) and village dynamics studies (VDS) program. Both village and taluk/mandal level data sets were used to explore the difference in the rainfall in terms of quantum and distribution in the village and reference weather station (RFS).

3. RAINFALL INSURANCE IN INDIA

3.1. Rainfall Insurance: Genesis, Evolution and Design

The rainfall insurance was piloted in 2003, in semi-arid tropics of India, with assistance from World Bank. The design of insurance contract was initially developed by ICICI Lombard ICICI Lombard General Insurance Company and piloted with BASIX, a Hyderabad-based microfinance institution (Hazell et al. 2010; Bryla and Syroka, 2007). Later, the product was being available in other parts of the country with more competing firms started marketing the products. These include Agricultural Insurance Company of India (AIC), IFFCO-Tokio General etc. The rainfall insurance scheme covers crops against rainfall deficiency during the primary cropping season i.e. monsoon (Kharif, June to Sept-Oct). The contracts are designed in three consecutive phases of the crop growth period that are contiguous and sequential, with each 35-40 days in duration corresponding to agricultural phases[4]. The total policy duration is for 110 days. The policy coverage day coincides with the onset and not necessary to be June 1. It may be noted here that June 1 is considered as south west monsoon start date in India. It is expected that monsoon hits Kerala coast on June 1. The day 1 of the policy cover is computed as per the hydrological definition. According to this definition, onset of the monsoon will be considered on the day when cumulative rainfall from June 1st will be 50 mm or more. However, if the above conditions are not met in June, then rainfall insurance policy invariably starts on July 1.

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[4] ICICI Lombard Weather Insurance Policy document, Kharif 2010, Mahabubnagar district, Telangana.

Insurance covers all three agricultural phases i.e. sowing (35 days), vegetative growth (35 days) and harvest (40-45 days). In the first two phases, payouts are linked to rainfall deficit and the third phase it is reversed. This means in the first two phases the payout is based on deficit rainfall and during the third phase it is based of rainfall excess. If the rainfall during the period is below particular threshold or 'strike', then the farmer will get the payouts and maximum at which they can receive the indemnity is called 'exit. The process of payoff including the strike and exit are given in the Figure 1. For the insurance abide with the standard definitions of rainy days in the aggregate rainfall calculation[5]. This calculation is required to satisfy the condition of start of the policy period. The quantities of rainfall received decide on the day 1 of the policy period and are divided into two parts: Policy activation rainfall and Index rainfall. Policy activation rainfall is the quantity of rainfall that contributes towards the requirement of first 50mm rainfall condition and Index rainfall is the balance rainfall of the day.

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[5] If the rainfall on a particular day is < 2 mm it is not counted in the aggregate rainfall. If rainfall on a day is > 60 mm it taken as 60mm in the aggregate rainfall calculations. This above condition is only applicable in case of deficit rainfall and not for excess rainfall cover.
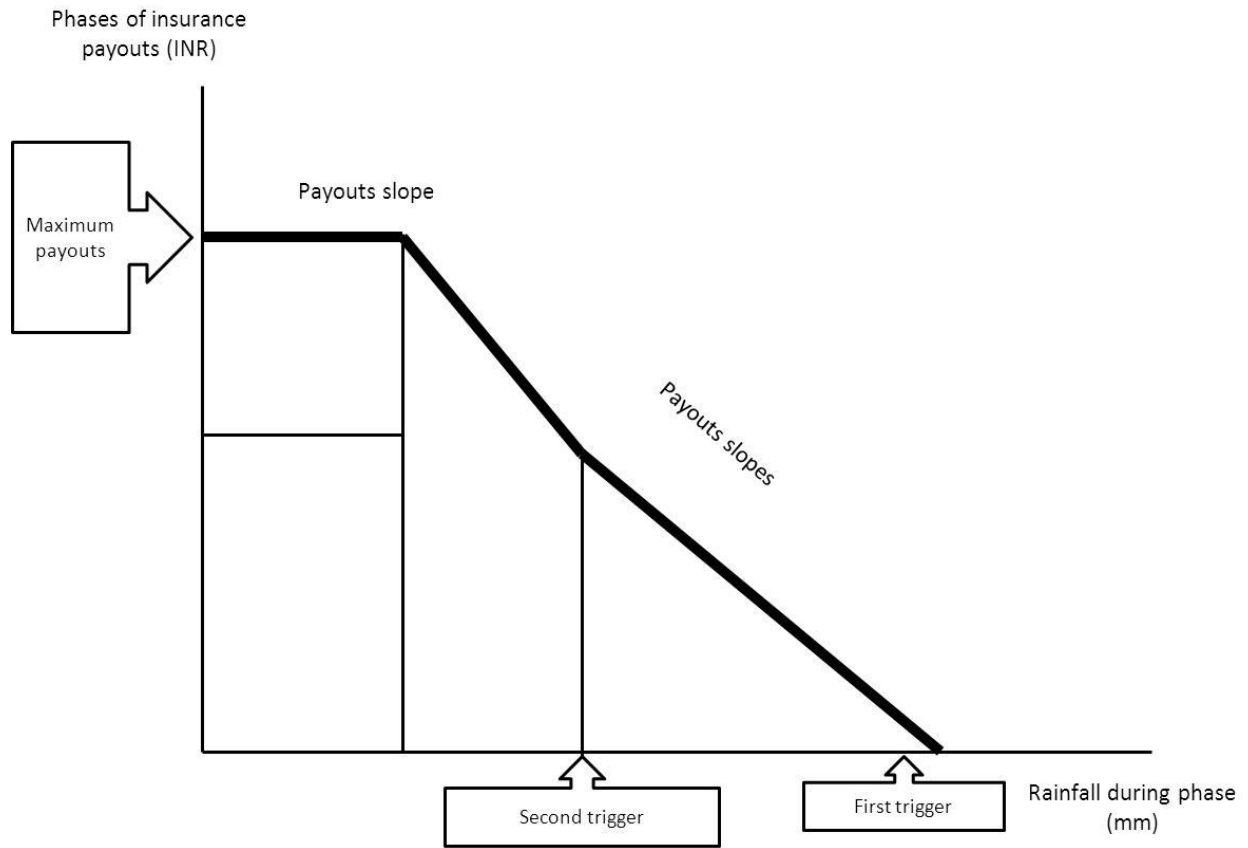
Figure 1: - The relationship between payoffs and phase of rainfall[*].

3.2 Operational Modalities

The rainfall insurance operates on the concept of "Area Approach". The scheme operates in selected notified reference unit area which is considered as unit area of insurance for the purpose of acceptance of risk and assessment of compensation. Hence, all insured-cultivator of the notified crop in the notified reference unit area is deemed to be on par so their terms of insurance coverage and assessment of compensation is concerned (Government of India directive dated 1st November 2013). In brief, for the purpose of indemnities paid, a reference unit area is linked to a reference weather station, weather data and accordingly claims would be processed.

Rainfall measurement and reference weather station: For particular region reference weather station data sets are used to process claims and compensation. The indemnity payment is directly linked to the rainfall received. The policy provider get rainfall data from the Indian meteorological department (IMD) or the automatic gauges maintained by the private players. There has been speculation on the station where rainfall data was used in calculating the strike. The insurance product is offered to households based on the gauge located not more than 20 km from the village (Gine et al. 2008). However, with the maximum available weather proximity data, insurance provider block/tehsil level weather data with an assumption block/tehsil level weather data, by and large reflects the condition of the experienced farmers (AIC, 2014). In addition, if data is missing for the particular region the station data that are close the reference weather station should be used.

Calculation of 'strike' & 'Exit': The calculation of strike and exit is considered to be the most critical parameters for a weather insurance contract. The interplay of these values with the

indemnity payment rates (or notional) control a trade-off between the protection level inherent in the weather insurance contract and the process of setting strike and exit determine the indemnity payment rates where the greatest dilution takes place in a weather insurance contract. However, the procedure in calculating this level is not transparent and unavailable to public for cross validation. Hence, there exit a high level of ambiguity among the stake holder and its entrusted support on reducing the risk of the vulnerable farmers (Shaik, 2013).

3.3 Distribution of Insurance Contracts and Process[6]

The Insurance Regulatory and Development Authority (IRDA) in 2005 legally recognized the importance of non-governmental organization, micro finance institutions and self-help groups in the involvement of marketing of the scheme. In the piloted area, local marketing, distribution and transactions were performed by the development organization for example BASIX, a large micro finance institution had a network of local agents as they called as livelihood services Agents (LSA's). These organizations received a commission for their service to cover marketing cost and payout disbursements. This service cost is provided by the provider along with the government support. At the end of the insurance coverage period, the provider organization calculated payouts based on the rainfall. Currently, this insurance scheme had been made mandatory for farmers who available credits from banks or financial institutions with sectioned credit for particular crops. The cost of inputs expected to be incurred in raising the crop and the premium is declared before the season and for the small and marginal farmers with support from both central and state governments. The farmer has to pay 50% of the insurance premium and the remaining premium is subsidized equally by the central and state government. The premium

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[6] This section substantially draws from Gine et al. (2008)

rates are based on the 'expected loss' which is depend on the weather trends for the region. In the first trigger, the payout will increase with the reduction in rainfall. For each 'mm' reduction in rainfall the payout increases along the slope till the second trigger the payout is fixed with respect to the premium paid. The premium patterns in rainfall insurance are different with respect to the crops.

The insurance product is availed by the cultivators before the cover risk period. It is notified in advance before the risk commencement period. The entire process from the communication of the product to the final settlement of the product is given in Figure 2. The product communication starts one or two month before the commencement of the insurance cover period. Once the farmer is ready and the documentation process start including the collection of premium and other details. The premium is collected and further processing and information are exchanged. The information such as the extent of crops grown, the phase to be insured (it can be single phase or even all the three phases) etc. and accordingly the policy is issued. Once the crop season passes, the claim is intimated to the provider by submission of claim. The claim is then processed by the insurance provider and the settlement is done within 45 days of end of the season. Usually, the service personnel come to the village and distribute the indemnities. They mention to the policy holder the rainfall data and the amount to be received.
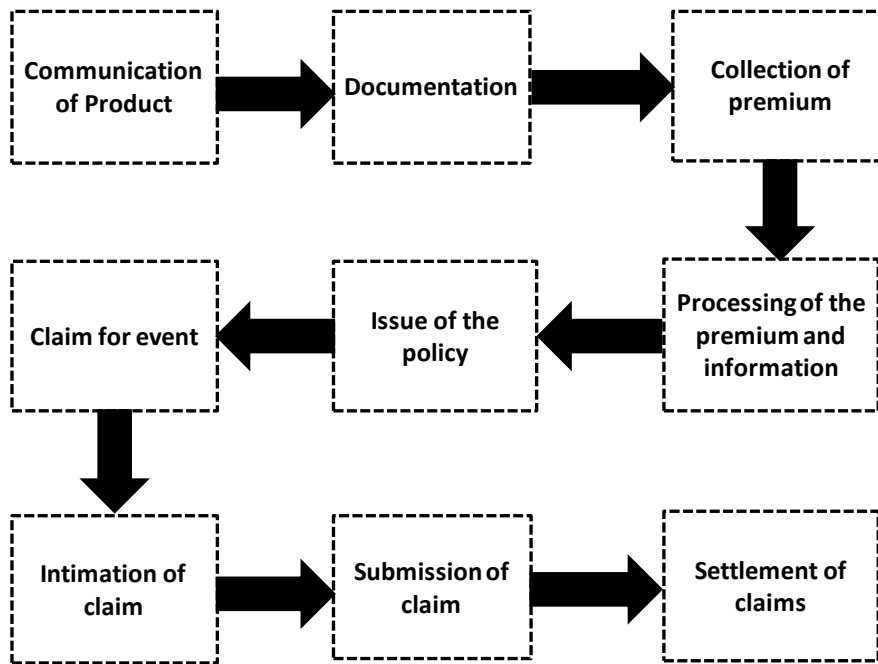
Figure 2: - Step-wise rainfall insurance process at village level

3.4. Governmental directives and support for the rainfall insurance

The governments (central and state) have been vociferously supporting this scheme with subsidy on the premium to promote better uptake of the insurance and minimize the risk caused by the variable rainfall in the region (Table 1). As per the recent circular on the directives of government, the weather based index insurance is implemented through the state run Agricultural insurance company (AIC)[7] and the enlisted private companies. The target area and crop to be insured is under the decision of the state government concerned. The government had made mandatory for the loanee farmer but is also available for the non-loanee farmer with government support. It is also directed to the insurance provider that the sum insured should be broadly equivalent to the cost of cultivation along with flexibility among the non-loanee on the sum insured (GOI, 2013). They have also capped the premium rates i.e. 10% in Kharif and 8%

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[7] In 2004, the Agriculture Insurance Company of India (AIC), a public company founded by the government one year before to manage the National Agricultural Insurance Scheme (NAIS), started to deal in index insurance.

during Rabi for food crops and oil seeds. The area to be targeted and the reference weather station is pre-notified by the State Level Coordination Committee on crop insurance, which is supposed to be reflective representative weather data. The insurance coverage can be through the existing network of financial institution at the grass root level includes district central cooperative banks, commercial banks, regional rural bank and also through their nodal agencies. There is also direction that the insurance would be accepted till commencement of the risk period and no insurance coverage is allowed once the risk period begins.

Table 1. Payable premium slab of rainfall insurance

| Crops	Premium payable by the insured cultivator
Wheat	1.5% or actuarial rate, whichever is less
Other crops (cereals, millets, pulses and oilseeds)	2% or actuarial rate, whichever is less
Horticultural Crops	UPTO 2% - No subsidy >2-5% - subject to minimum net premium of 2% payable by farmer
	>5-8% - 40%, subject to minimum net premium of 3.75% payable by farmer
	>8% - 50%, subject to minimum net premium of 4.8% & max 6% payable by farmer

Source: G.O.I., 2013.

As per the recent government directive issued on 1 November 2013, the level of support through the subsidies on premium (Table 1). The subsidies have been essential and they are supported by the government for the committed social objectives. The government supports this program not only the part of the premium, but also most of the delivery service costs and also aggregate losses over the period of time. The number of insurer and the government share is being on rise from the inception of the pilot scheme in India (Figure 3 and 4). The government's national budgetary allocation in the crop insurance scheme is in the tune of 600 crores. However, there

have been rise in central support in insurance sector in India. In 2013-14 there has been 128% rise in budget allocation from 2012-13 (Figure 5).
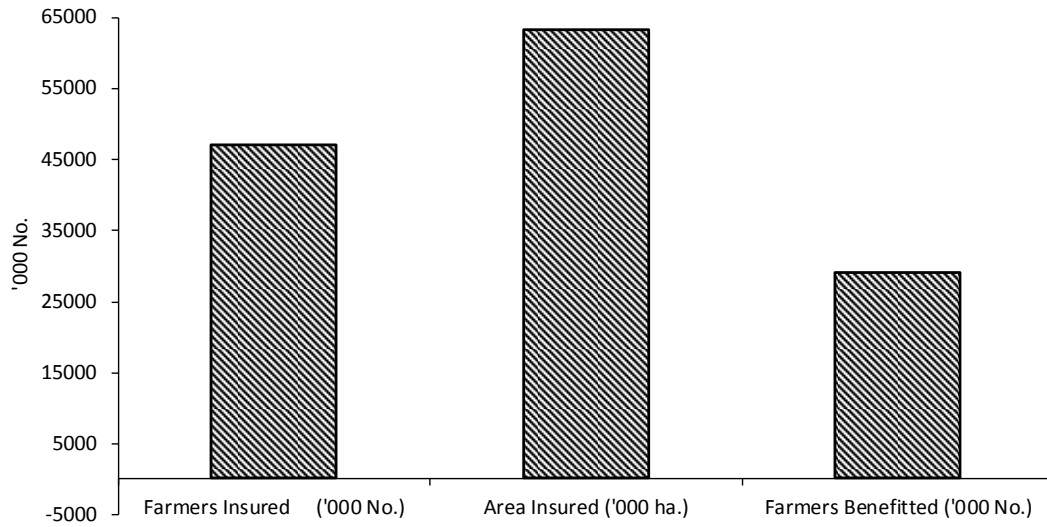
Source:- GOI, 2014

Figure 3:- Cumulative statistics of weather based insurance scheme of India (2007-2013)

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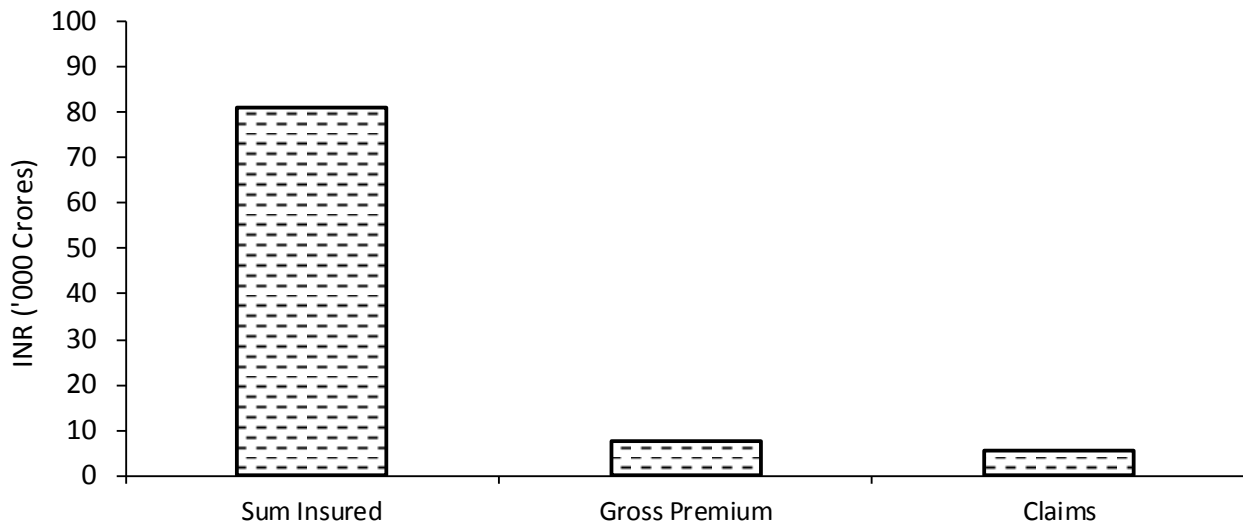
Source: - GOI, 2014.

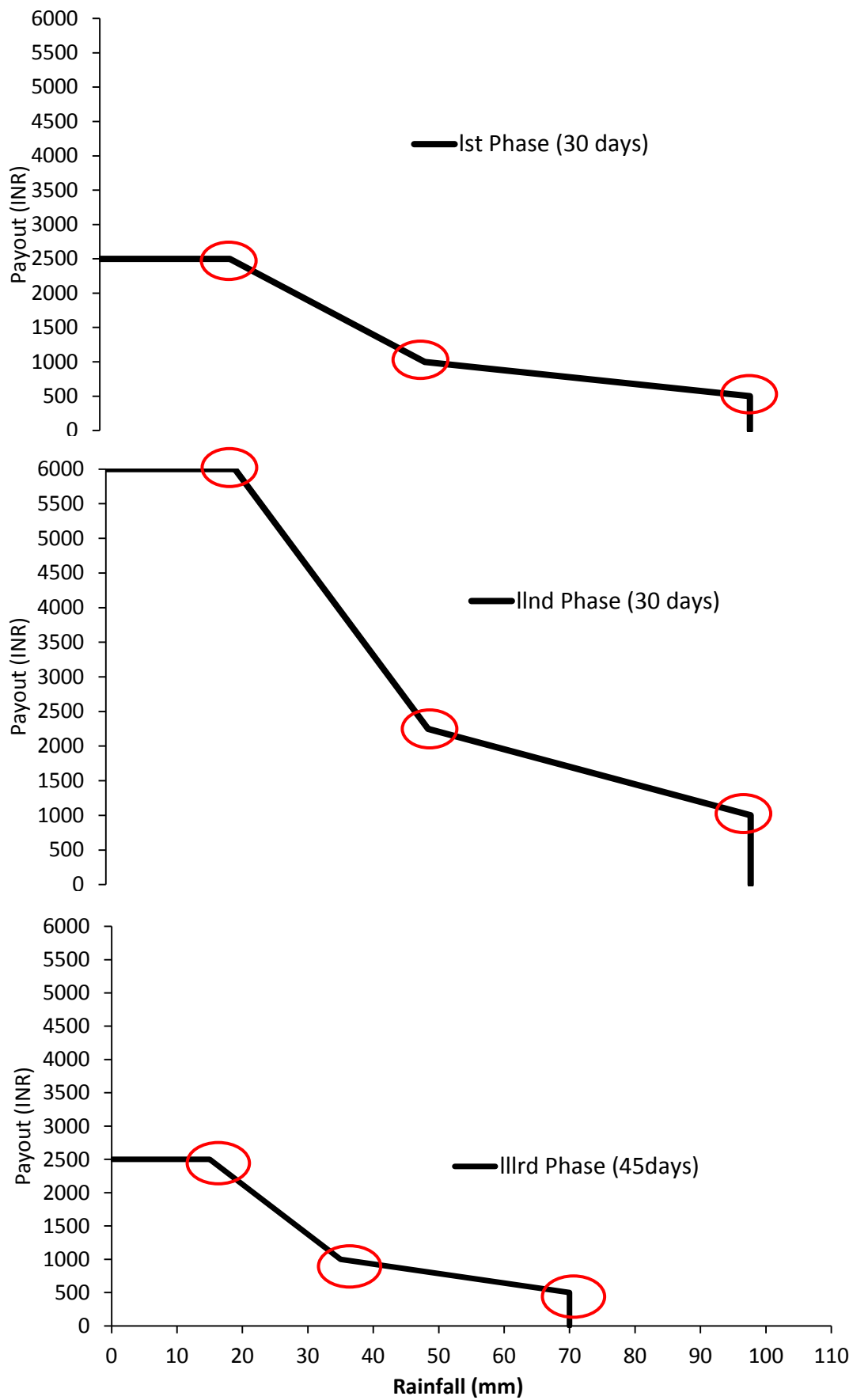Figure 5:- Cumulative statistics of weather based insurance scheme of India (2007-2013)

Figure 4. Payout scheme for cotton crop in India in phase I, II and III, Madgul mandal of Mahabubnagar district, Telangana State, India in 2014.

Among the semi-arid states of India, the highest percentage of insured farmer and area is Andhra Pradesh (now Telangana and Andhra Pradesh); Madhya Pradesh, Karnataka Maharashtra and Gujarat. (Figure 6). With the directive of the government, state level committee decides on the crops to be considered under this scheme (Table 2). The crops considered under this insurance scheme may include cereals (Ragi, maize, sorghum etc.), pulses (black gram, green gram, soybean, sunflower etc.), oil seeds (ground nut, sunflower, castor etc.). The Rabi crops are also considered under the scheme where the weather parameter is not rainfall.

Table 2:- Crops that are come under pilot weather based crop insurance scheme

|	Kharif	Rabi
Andhra Pradesh	Groundnut, castor, Cotton, Red Chilly, Sweet lime, Oil palm & Tomato	Mango, Banana & Cashew nut
Karnataka	Ragi (RF), Maize (RF), Sorghum (RF), Tur (RF), Black gram (RF), Green gram (RF), Soybean (RF), Sunflower (RF), Groundnut (RF), Potato (Irri & RF), Cotton (Irri), Cotton (RF & Irri), Onion (RF), Chilly (Irri & RF), Grapes & Banana	Sorghum (Irri & RF), Wheat (Irri & RF), Bengal gram (Irri & RF), Potato (Irri), Grapes & Mango
Maharashtra	Orange, Guava & Sweet Orange	Grapes, Banana, Sweet Orange, Pomegranate, Guava & Mango
Rajasthan	Pearl millet, Sorghum, Maize, Green gram, Moth, Black gram, Guar, Sesame, Castor, Groundnut & Cotton	Wheat, Barley, Gram, Mustard, Tara Mira, Cumin, Isabgol, Fenugreek, Coriander, Aonla, Potato, Kinnow, lentil & Pea

Source: GOI, 2013
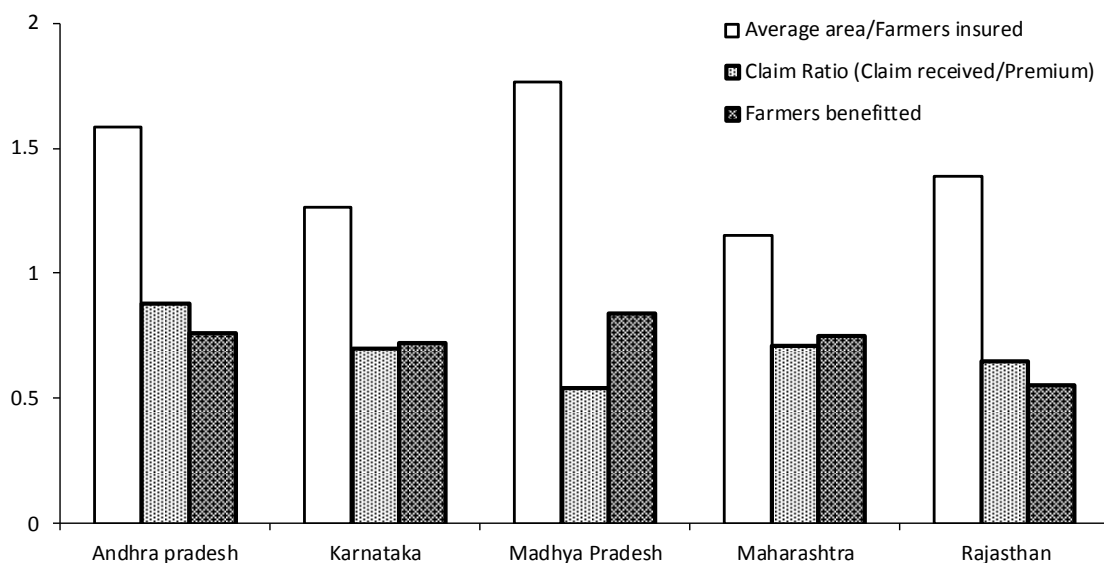
Source:- GOI, 2014.

Figure 6. Percentage contribution from states in terms of number of farmer and area insured (2007-2013)

4. RAINFALL INDEX INSURANCE

4.1 Reference Rainfall vs Actual Rainfall in the Village

Analysis of long term climatic data undertaken by the National Rainfed Area Authority (NRAA) showed that on an average drought occurs once in every three years in the SAT region of India. Drought occurrence ranges between once in two years in western Rajasthan and once in 5 years in northern Madhya Pradesh (Figure 7).
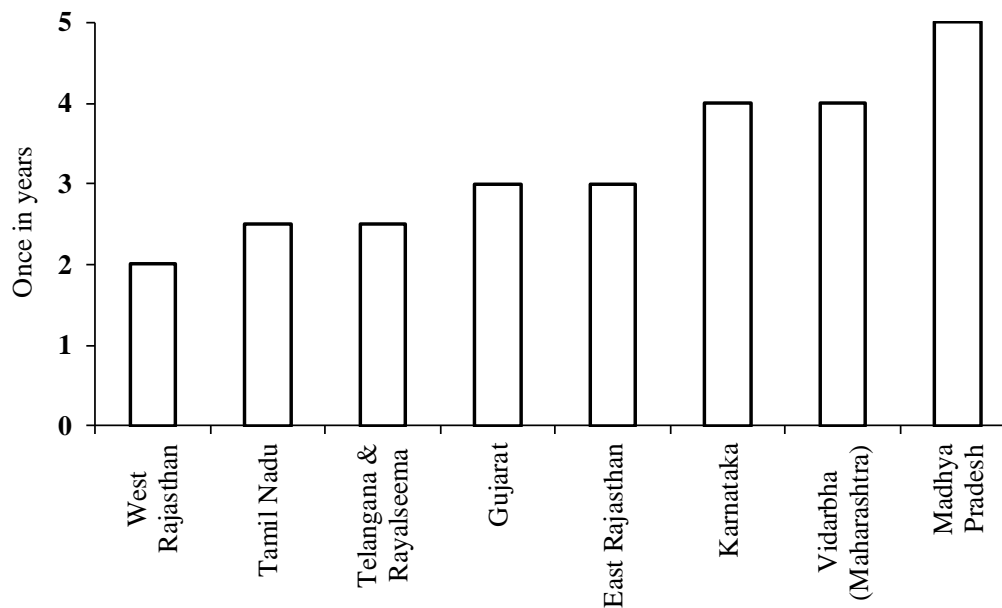
Source GOI, 2009
Figure 7:- Frequency of occurrence of drought in the semi-arid region of India

We have analyzed the mandal level rainfall data (maximum available data) were taken from the mandal rainfall station, wherein this rainfall dataset are used to calculate the payout as per the term sheet design of the insurance. We have also analyzed the village rainfall data for six villages located in Telangana and Maharashtra. In India, the spread and density of weather station are minimally at mandal/taluk level. However, the availability of these data sets is only for the last two decades. As for designing the product, long term data sets are needed along with greater distribution of weather network. The minimum available weather information for majority of the villages in semi-arid region is the mandal/taluk level weather station. This station is taken as the reference weather station in designing the product and payouts. The past studies had the apprehension of not perfectly correlated (<75%) with rainfall in the village/plot level. The relationship between measured rainfall and crop yields vary considerable based on the bio-physical and socio-economic factors of the households. We have carried out a correlation analysis of the village and mandal level rainfall data.

Estimate correlation coefficient was high (0.75). However, we need to see this in proper perspective. That is, eligibility criteria depend on mm of rainfall. Therefore, even we are able to be correct in 75 percent cases, we are likely to predict the village rainfall condition in a wrong manner for 25 percent cases. In other words, one out of four predictions may be incorrect. Thus, the long term village level rainfall data sets confirm that the village level rainfall data and reference weather station (mandal data) do not correlate satisfactorily (Figure 8). Hence, this could under and overestimate the proportional loss experienced by the farmer. The cumulative distribution curves drawn showed an unequal variance ($p_{\text{one tail}}$ = 0.28) with minimum correlation of rainfall in village and mandal level data sets (Figure 9).

Figure 8:- Experimental correlation of kharif rainfall data observed in the villages and their respective mandal (2005-2012)
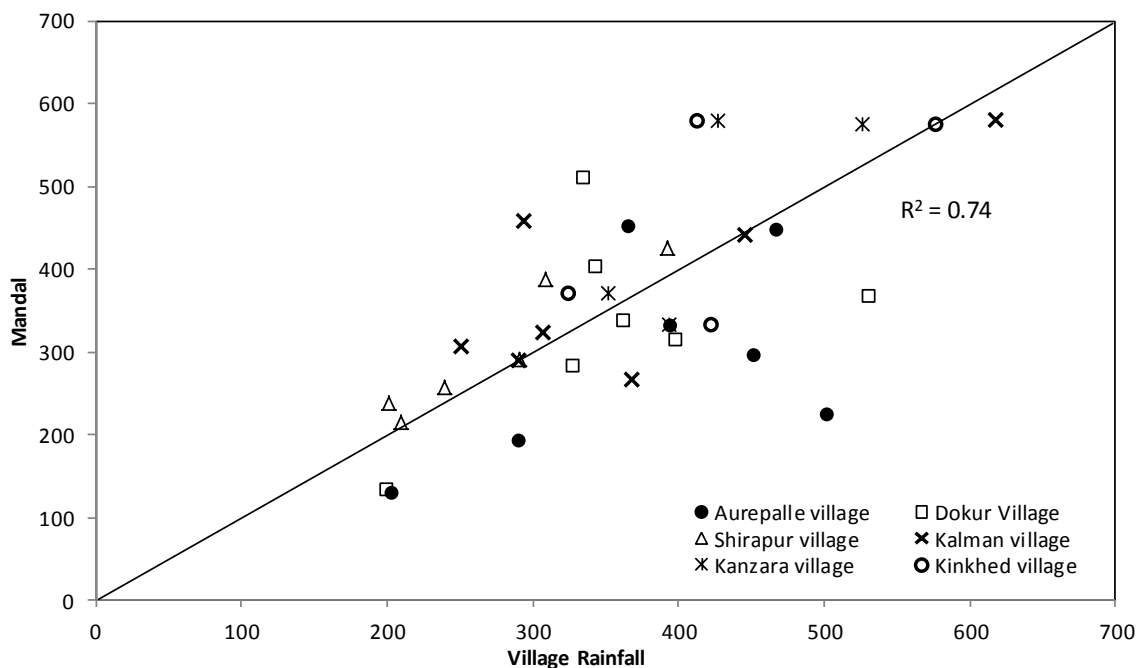
Source: - VDSA, 2014.

Figure 9 Cumulative distribution function curve of rainfall received during the kharif season (2005-2012) at villages and their corresponding mandal.
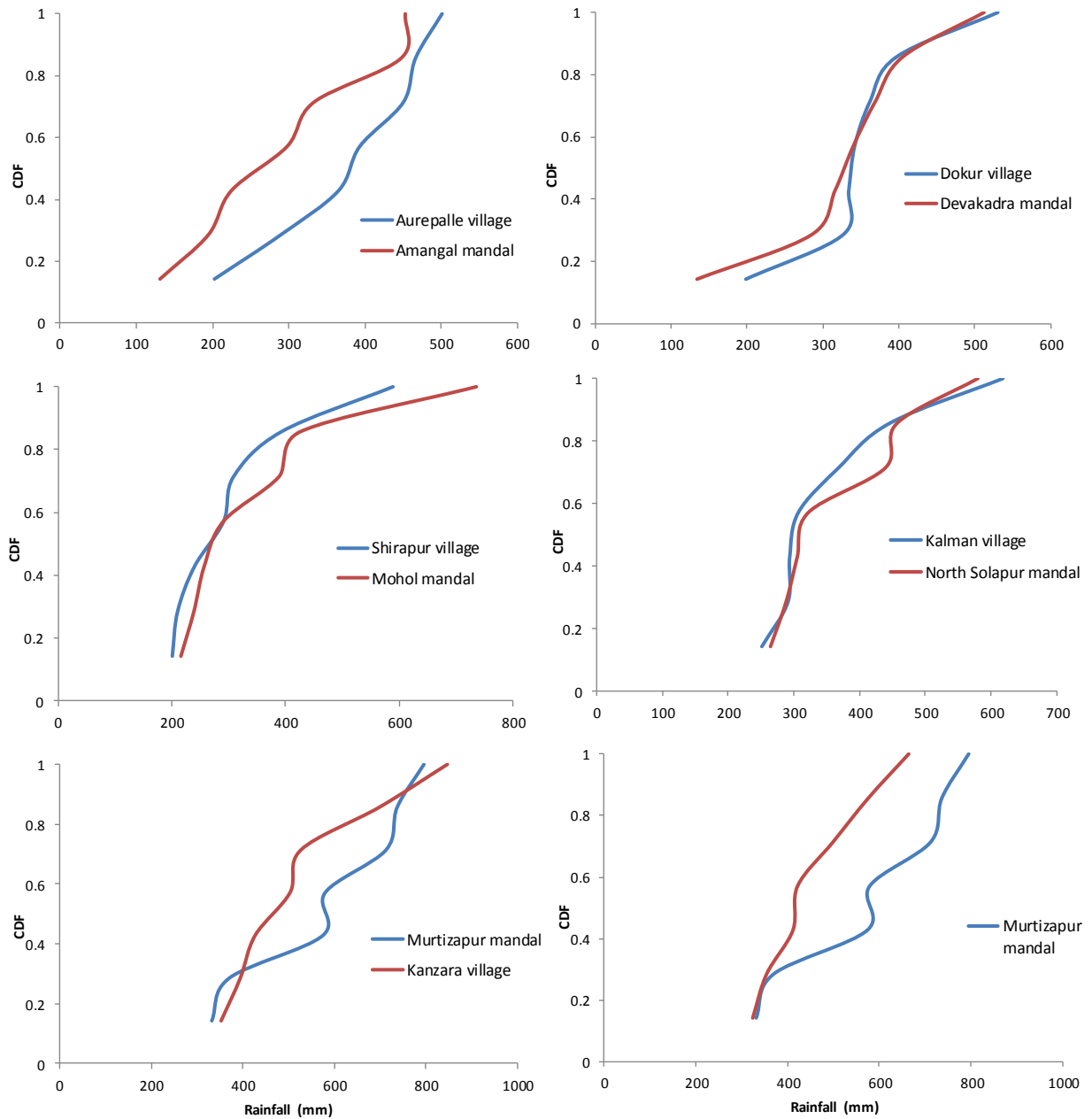
Source: VDSA, 2014

4.2 Real time analysis of insurance payoffs.

A real time payoff was calculated hypothetically for the insured farmers in the cotton crop in Mahbubnagar district of Telangana state. The terms and condition of policy catered by the Agricultural Insurance Company in the district (Annexure 1) were taken as terms to calculate

the payoff for seven years using weather data of both mandal and village level. These payoffs are compared with the actual cost of cultivation for the state (GOI, 2011).
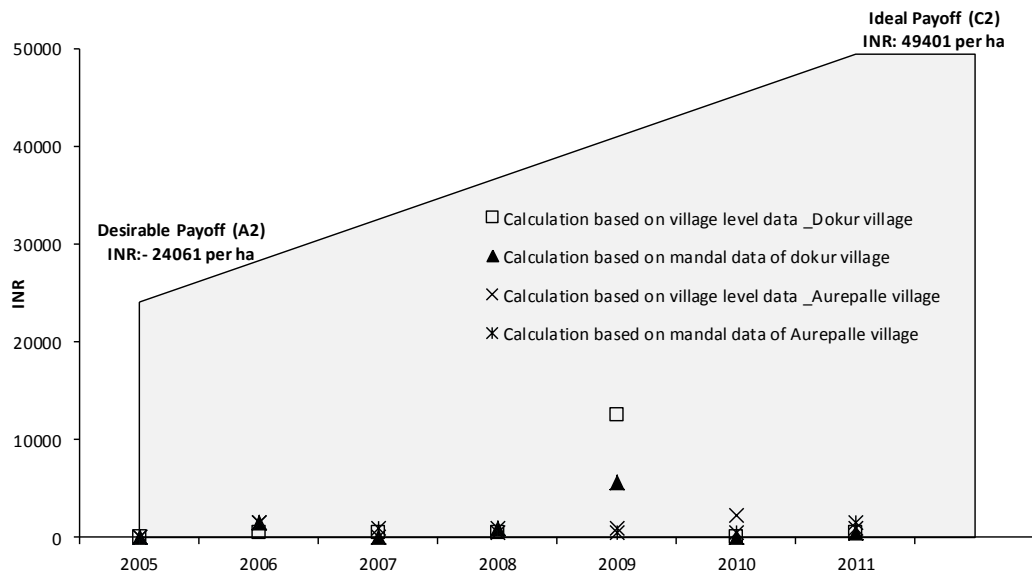

Figure 10:- Payoffs are calculated as per the AIC policy term for the Cotton crop. The payoffs are compared with the standard cost of cultivation i.e. desired payoff (A2) and Ideal payoff (C2).

As per the cost of cultivation data for the cotton crop, the maximum payoff that could be received is 26,000 per ha which is slightly higher than the desirable payoff (INR: 24061). Hence, if there is very severe drought as per the condition of the policy they will not able to cover the cost incurred by farmer. The cost include total operation and family labor cost. The ideal payoff i.e. the cost C2 (INR: 49401) is still far to achieve. If the payoff could cover desirable cost, if could aid to keep them to cultivation (Figure 10). However, the profit loss is invariably not covered by the design. During this period of analysis, the years 2009 and 2011 are drought years and the pay offs are even less than 50 % of the desirable payoff (A2) calculated using village level rainfall datasets. The payoff calculated using mandal and village level rainfall datasets, the pay offs are often less than 10 % of the desirable payoffs. Furthermore, these villages experiences drastic retrieval of groundwater over the years with dried off tanks and failed bore wells. It further weakens the farmers' capacity to cope.

4.3 Rainfall Insurance: Farmers' experiences

To know the experiences of the farmers we had conducted focus group discussions with the farmers of Dharmapur village located in Mahbubnagar district of Telangana state. From the focus group discussion, it was evident that farmers are willing to avail the rainfall insurance that was catered to the farmers[8]. These farmers were availing rainfall insurance scheme from 2007 -2010. In Andhra Pradesh, the castor growing farmers were only able to participate in the insurance program. The total premium paid was around 12% of the total sum insured and the premium was subsidized 50% by the government. The maximum claim limit was 1000INR[9] per unit[10] for each phase with a premium of INR120. The premiums paid by the farmer in all the three phases were not equal and the highest premium was charged for the final phase. Final phase is economically important phase with respect to economic output. Insurance product was catered to the farmers through a micro finance company[11] and a local bank. Field level worker came to the village and explained about the new scheme regarding the premium and the return. They came twice first to issue insurance and later to distribute payouts. Main criteria was to have the area of castor, they confirm the land sown from the land passbook[12]. They didn't physically go to the field to confirm the farmers claim. It was not linked with loan availed by the farmer, however, the crop insurance was made compulsory by the finance institutions that distribute credit to the farmer. The payouts are distributed on time within 15 days of end of policy period. Farmers claimed that they showed the rainfall data and said this will be the amount of payouts but not really made to understand how they are calculated. Even information on the calculation of strike and exit are also not well explained to the farmers. Farmer find the present system have less coordination with the

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[8] Dharmapur village of Mahbubnagar mandal farmers insurance was there only for Castor crop and the crop was grown by 20% of the farmers.
[9] IUS$ = 60INR
[10] 1 Unit = 1 acre
[11] Micro finance company is BASIX; local bank is Krishna Bima Samruddhi Bank
[12] Land passbook only shows the area owned by the farmer

governmental department and the insurance providers as the major source of information for them is through fellow farmers or relatives (Figure 11). The question were posed to farmers whether they are willing to take the insurance for the coming years?, they want the insurer to cater the product to them and also to cover other dryland crops groundnut, cotton etc. Even though, entire three insured year nobody received the maximum policy insured as the rainfall was not severe drought years. Farmers are not aware about the support from the government in terms of premium share. They feel that government should encourage the rainfall insurance option among the farmer with greater coverage and including more crops that are of high input and risky. They have apprehension towards the loss rate provided by the insurance company. In 2010, loss rate is INR10 per mm for all the three phases.

Figure 11:- Source of information on agricultural insurance for the farmers in the region
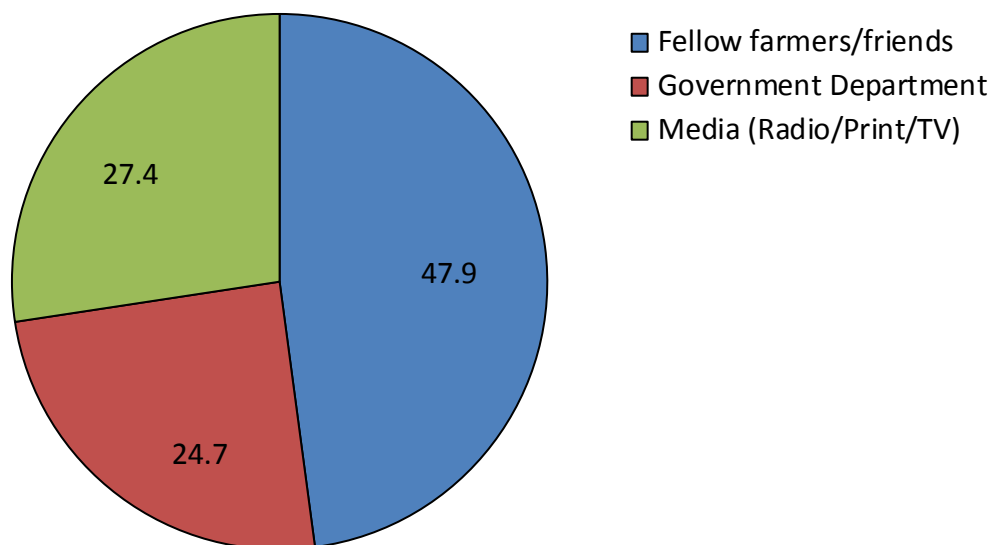
Source: - VDSA, 2014

4.4 Risk minimizing potential and constraints

Our initial analysis corroborates the previous study on the limitations of the rainfall insurance among the rural communities. Past studies identified through household surveys that the potential of risk reduction, risk on their main income source (harvest income) and also advice

from their fellow farmers are the main drivers in buying of rainfall insurance. The identified

reasons for minimum penetration of the insurance among the households does lack of proper

understand about the product, limitation of cash to pay premium and the limited reliable and

acceptable rainfall data (Table 3). There have been increasing level of take up in other arid

region of India such as Gujarat (Cole et al. 2010) during the initial years driven by support

from government and non-governmental agencies.

Table 3:- Constraints associated with limited scaling up of rainfall insurance

Identified constraints	References
1. Imperfect correlation with actual rainfall and rainfall data considered	Gine et al. 2008; AFC, 2011;
2. Unsatisfactory correlation between rainfall and farm household income	Gine et al. 2008
3. Through information and education about the product on its risk mitigating potential	Gine et al. 2012; AFC, 2011
4. Price and liquidity constraints	Gine et al. 2012; Binswanger-Mkhize, 2012; GOI, 2014
5.Lacking trust among farmers and insurance provider	Gine et al. 2012; Binswanger-Mkhize, 2012

We expect that there will be increased uptake if they convince that this scheme have

satisfactory risk coverage of their enterprise with minimum investment. It is also argued that

increased risk cover will enable these farmers to re-orient their decisions towards more

profitable and riskier crops. The indemnity received by the farmers seldom correlate to the

actual household income loss, being the other main constraint to satisfy the apprehension of

the farmer. With support from the government, minimal participation of poor households

main due to out of target region and possibly due to lack of initial premium payment. Low

correlation of reference weather station rainfall data to actually experienced in the micro

level. With minimum rain gauges and minimum rainfall measurement, rainfall is likely to be

different from the rainfall measured Presence of ambiguity on the product design and

mechanism among the farmer with minimum on how the calculation of pay outs are

calculated, on other information etc. are minimum. Absence of efficient extension mechanism

on the ground and this had been identified a major reason for minimum impact in uptake of the rainfall insurance product (Table 3). Confidence and trust building among farmers and service providers is identified factor in taking this product. For example, in Gujarat the rainfall insurance product was success because it was marketed through already existing NGO that had good rapport with the farmers.

We find evidence of change in the total farming expenditures by households; a substitution from less risky subsistence crop towards higher-risk, higher-return cash crops in the region (Cole et al. 2012). Even though, the vulnerable households over the years are taking unwarranted steps as risk-management and risk-coping strategy that includes self-insurance via savings and informal mechanisms but this always are not sufficient in their path towards sustainable livelihood. A support mechanism is always advisable for the risk farmers and it will be welcomed by them. The allocative farming efficiency and farmer income could be significantly improved by the introduction of innovative financial instruments. There is keen interest among the farmer to insure their crops so they act as financial cushion to loss incurred by climate extremes. Through government support have certainly given an impetus to WBCIS in India particularly rainfall insurance in the arid and semi-arid region. Under the ambit of WBCIS, the financial support of the government has been well complemented by a fairly lenient regulatory environment; conducive during the initial stage of the scheme in recent time. From a development economics perspective, studies have suggested that an incomplete insurance would be an important constraint on development. Looking at the risk-reducing potential of the WBCIS, this can be viewed at different perspective that includes farm management decisions, economics, bio-physical, farm decision economics etc. However, to explore the efficacy one can undertake any one perspective. Recently, introduction of crop simulation models and bio-economic analysis to predict the yield loss and to minimize the correlation gap between actual yield loss. This could aid them to

standardize the policy design to ensure greater impact on risk reduction. In the systematic review of literature, there has been no evidence that rainfall insurance will impact on investment, consumption-smoothing, or welfare (Cole 2013). However, it is certainly been difficult to rule out the hypothesis that rainfall insurance is ineffective, there are a number of reasons it may be particularly difficult to identify a causal chain between access to insurance and outcomes. In late 2000's there have been increasing level of insurers in the region that also include states such as Andhra Pradesh, Gujarat. Initial information from the farmer that if the farmer has substantial risk insurance coverage they will adjust the investment decision more riskier and profitable crops. It has also been argued that agricultural insurance in India has not made much headway even though the need to protect Indian farmers from agriculture variability has been a continuing concern of agriculture policy. Despite these strategies, vulnerability to poverty remains to be highly risky. Binswanger (2012) argued that other policies such as employment guarantee scheme would be preferred by the poor farmer and have better adaptation potential. It spreads the crop losses over space and time and helps farmers make less investment in agriculture. The disadvantage of index insurance is the potential basis risk between the rainfall index and the actual income loss suffered by the household. This will be greater when the distance between the insured household and the rain gauge is larger, and also small number of farmers who are able to reach the insurance systems have stepped back as there is no transparency in settling of claims and if at all there are settlements, it takes years by that time calamity has taken its toll. The three biggest challenges being the scaling-up affordable weather insurance are: a) designing a weather index with higher predictive capability to proxy crop losses taking into account the inter-farm variability at an acceptable level of disaggregation b) the large 'basis risk' inherent in the rainfall index which is the most preferred and widely-adopted weather index in India. c) Products available have been skewed towards the major Kharif commercial crops in the

region and affordable weather insurance for Rabi and other horticultural crops are lacking in the state. This initial assessment recommends in-depth analysis on understanding the strength and weakness together with economic gain and payout frequency and phases insured by the farmers. A promising way to manage the risks associated with climate change is community-based adaptation which can empower communities and generate synergies with greater poverty reduction and sustainable development objectives (Heltberg et al., 2009) and the planning should be prop-poor centric and aimed uplift the poor on a faster pace than the non-poor.

5. CONCLUSIONS

The study reviews the design and operation modalities of the rainfall insurance scheme at micro level in minimizing risk among the rainfed farmers of semi-arid tropics of India. There exist an enormous potential of the rainfall insurance scheme in addressing the needs of the farming community which can mitigate the adverse impacts of rainfall uncertainties. There is need to amend the scheme in terms of methodical transparency, reference weather station, awareness and farmers trust building in addressing the existing challenges. Appropriate steps need to undertake with greater government interventions to enable greater risk coverage and effective implementation of the scheme.

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Annexure 1.

The term sheet of the AIC for the Mahabubnagar district of Telangana

NATIONAL CROP INSURANCE SCHEME (NCIP) - WEATHER BASED CROP INSURANCE SCHEME (KHARIF 2014)
TERMSHEET

Annexure I.8.a

| Crop : COTTON | District : | MAHABUBNAGAR | Mandal: All Notified Mandal | Unit : Hectare |

1A. Rainfall Volume

Period :   6-Jul   to   31-Oct
Index: Aggregate of rainfall over respective Phases

	PHASE - I			PHASE - II			PHASE - III	
PERIOD	6-Jul to	5-Aug		6-Aug to	15-Sep		16-Sep to	31-Oct
	Rainfall (mm)	Payout		Rainfall (mm)	Payout		Rainfall (mm)	Payout
STRIKE I (<)	< 100	500		< 100	1000		< 70	500
STRIKE II (<)	< 50	1000		< 50	2250		< 35	1000
STRIKE III (<)	< 20	2500		< 20	6000		< 15	2500

| TOTAL PAYOUT (Rs. | 11000 |

1B. Rainfall Distribution

Period :   10-Jul   to   5-Sep
Dry day: A day is defined as dry day if Rainfall on the day is < 2.5 mm
Index: Number Of Consecutive Dry Days (CDD)

Number of CDD		Incremental Payout
=	28	1500
=	29	1800
=	30	2100
=	31	2400
=	32	2800
=	33	3200
=	34	3600
=	35	4600
=	36	5600
=	37	8100
>=	38	10000

Excess Rainfall Coverage

Period :   6-Jul   to   31-Dec
Index :   Maximum of consecutive 3 days' cumulative rainfall

	PHASE - I			PHASE - II			PHASE - III		
PERIOD 6-Jul	to	25-Aug	26-Aug	to	15-Oct	16-Oct	to	30-Nov	
STRIKE (>) 150	mm		200	mm		150	mm		
EXIT 250	mm		300	mm		250	mm		
Notional (Rs/mm) 50.00			50.00			50.00			
MAXIMUM					5000				