

## Extended Abstract

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<b>Paper/Poster Title</b>	<b>Is weather crop insurance a forced mitigation strategy against climate change?</b>
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<b>Abstract</b>	<b>200 words max</b>
<p>North-Western Himalayas, India is one of the most vulnerable areas in terms of climate change and associated insecurities in farming. Restructured Weather based Crop Insurance Scheme (RWBCIS) was introduced in 2016 to protect farmers against weather adversaries with compulsory coverage of loanee farmers and optional for non-loanee farmers. In 2020, following kharif season the scheme is made voluntary for both the loanee as well as non-loanee farmers. Keeping in view the vagaries of climate change, the present study assesses the adoption of weather based crop insurance as climate risk mitigation strategy by apple growers in two states of North-Western Himalayas. The apple growers' willingness to pay (WTP) for RWBCIS is assessed using contingent valuation method (CVM) by collecting primary data of 1350 apple growers in Jammu &amp; Kashmir, where the policy is not in vogue. In Himachal Pradesh, where the policy is being implemented, the adoption of RWBCIS was assessed under the changed policy framework by collecting data from 300 growers. In both the situations, the apple growers' reflected very poor demand for RWBCIS which shows that farmers even after considering climate change a potential threat to farming does not consider crop insurance an effective mitigation tool against the weather extremes.</p>	
<b>Keywords</b>	Weather-based crop insurance, willingness, loanee farmers, adoption
<b>JEL Code</b>	Q18, G22, G32 see: <a href="http://www.aeaweb.org/jel/guide/jel.php?class=Q">www.aeaweb.org/jel/guide/jel.php?class=Q</a> )
<b>Introduction</b>	<b>100 – 250 words</b>
<p>Global warming if kept to 1.5°C, warming in the Hindu Kush-Himalayan (HKH) region &amp; northwest Himalaya will likely be at least 0.3°C and 0.7°C higher, respectively. The recent events of weather extremes, including floods, hailstorm, untimely rainfall etc. had caused significant damage on the fields. There are many on-farm solutions to minimise the negative effect of climate change. However, crop insurance is considered to be an effective mitigation strategy against climate change to be implemented with the intervention of government agencies in India. Apple is the principal fruit crop of J&amp;K and Himachal Pradesh which fall under north-western Himalayan region of India. Apple growers have been demanding comprehensive scheme to mitigate the effect of extreme weather events. The studies revealed that farmers have apprehensions in adopting insurance due to various constraints such as non-settlement of claims (Cariappa <i>et al.</i> 2018), unfriendly insurance modalities for farmers (Ke <i>et al.</i> 2015) etc. Among other factors affecting the adoption of crop</p>	

insurance include subsidies (Karlán, 2014), basis risk in case of weather insurance (Tadesse *et al.*, 2015; Hill *et al.* 2016). Therefore, the question is whether the past experiences of extreme climatic events affects the apple growers' WTP for weather based crop insurance scheme or not. The present study is an attempt to assess the apple growers' willingness to pay for weather crop insurance in north-western Himalayas. The factors affecting the adoption of weather based insurance by apple growers' pre and post policy alteration are also assessed.

**Methodology**

**100 – 250 words**

Two sets of sample were drawn, first the area where the scheme is already implemented and the other where the scheme is yet to be implemented. The survey schedule was prepared in consultation with department officials and experts of South Asian Network for Development and Environmental Economics (SANDEE). The theoretical idea underlying the proposed study is economic theory of utility maximization. The individual grower's demand for rainfall-based index insurance scheme was modeled on the basis of standard random utility framework (Hanemann, 1984; McFadden, 1973).

The contingent valuation literature was thoroughly revised to frame the schedule and includes a detailed description of RWBCIS and questions on socio-economic features of growers. The responses for WTP were recorded in case of orchardists who were ready to join the scheme using double-bounded-dichotomous-choice (DBDC) response. Initially, four different types of outcomes are obtained (yes/yes, yes/no, no/yes, no/no) with response to star-up bid. The follow up bid is contingent upon the response to the initial bid. Five initial bids were fixed based on the existing premium for apple insurance in neighbouring state with varying level of subsidies. The bids were randomly assigned across respondents to avoid starting-point bias. The secondary data revealed that there was a drastic reduction in insured apple growers in the year 2021 as compared to the year 2020 in the state of Himachal Pradesh where the scheme has been implemented. Maximum likelihood estimates procedure was utilized to assess factors affecting the adoption of weather based crop insurance by apple growers.

**Results**

**100 – 250 words**

The average age of apple growers is 48.69 years with minimum age of household head of 25 years and maximum age of 85 years whereas the average number of trees in an orchard of one hectare is 235 with average age of around 16.78 years. The most frequent and most serious disaster in terms of its effect of apple production is the Hailstorm, followed by excess rains, untimely rains and incidence of pests and diseases. The mean WTP of apple growers for weather insurance without inclusion of covariates is Rs. 37.22 per tree which reduces to just INR 17/- per tree with inclusion of covariates. The WTP is fairly low that the prevailing rate of around INR 53/- (Rs. 40 for main cover + Rs. 13 for add-on hailstorm). Among the socio-economic and farm characteristics, number of earning members in a family, off-farm job and total land holding are affecting the WTP negatively, whereas age, education, annual farm income, area under apple crop, risk aversion and risk perception are affecting the WTP positively.

After the policy change in respect of compulsory coverage of farmers, there was a sharp reduction in adoption of RWBCIS. Age, off-farm job, total land, number of trees and distance from weather are negatively affecting the willingness to adopt weather based crop insurance scheme, whereas education is positively and significantly affected the adoption of RWBCIS.



**Discussion and Conclusion****100 – 250 words**

The primary objective of this research is to elicit the willingness to pay of apple growers for weather insurance. There are increased incidences of extreme climatic events affecting the apple growers. All apple growers had shown their intent to buy insurance but very few of them were having understanding about the modalities of RBWCIS. The most important reason for farmers to mistrust the scheme is non-availability of localized meteorological data. The growers having large area tend to estimate premium for total number of trees and therefore reluctant to opt for insurance because of high total premium for whole farm. Mistrust towards private companies in terms of non-payment of compensation is also an important factor for farmers to not entering the scheme. The significant factors affecting the WTP are education, no. of earning members, off-farm job, total land, area under apple crop, and risk perception. Any source of revenue outside the farm diminishes the WTP for insurance, as opposed to the findings of Bogale (2015) and Abbas *et al.* (2015). The annual income has a very small coefficient but indicates positive relationship with WTP. This indicates that richer farmers can easily afford the premium and therefore ready to avail insurance for more safety (Tadesse *et al.*, 2017). Government wants to share the risks associated with climate change in agriculture and thus amalgamation of welfare schemes such as Prime Minister Nidhi Scheme (provision of INR 6000/- in three instalments) can be considered for promoting the insurance.