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For kind attention of:

The Hon'ble Prime Minister's Office,
the Ministry of Agriculture and Farmers' Welfare,
and all others interested

On Critical Policy Issues in India's Agricultural Economy

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Contents

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Changing Patterns of Turmeric Production in Tamil Nadu

T. Priya, K. Jothi Sivagnanam

Introduction

- India is the largest producer, consumer and exporter of turmeric in the world, and Indian turmeric is considered the best because of its high curcumin content. Tamil Nadu which once had 50% share in turmeric production in the country, now occupies only the third position in both production and area under turmeric among all the states in India (after Telangana and Maharashtra). Table 1 shows the area under turmeric in Tamil Nadu from 2000-01 to 2018-19.

- From the Table 1, we can see that the area under turmeric in Tamil Nadu has declined from 67,246 hectares in 2011-12 to 23,647 hectares in 2018-19. A major contributor to this decline is the decrease in the turmeric cultivation in Erode district, which contributed more than 60% of the production in the state.

Table 1: Area under Turmeric Cultivation in Tamil Nadu (2000-01 to 2018-19) (Ha.)

Year	Area
2000-01	33000
2001-02	23638
2002-03	17298
2003-04	16181
2004-05	21616
2005-06	25970
2006-07	30528
2007-08	27303
2008-09	29875
2009-10	33366
2010-11	51446
2011-12	67246
2012-13	46151
2013-14	31968
2014-15	26074
2015-16	29877
2016-17	35795
2017-18	25500
2018-19	23647

Source: *Various issues of Season and Crop Report, Directorate of Economics and Statistics, Government of Tamil Nadu*

- Erode district stands first in both area and production of turmeric in Tamilnadu. It is one of the largest marketing centres for turmeric in the country. The crop is cultivated in all the seven talukas of Erode district: Erode, Sathiyamangalam, Bhavani, Gopichettipalayam, Perunthurai, Kankeyam and Dharapuram. Both finger and bulb turmeric rhizomes are grown in Erode district. Of the two important varieties of turmeric - ChinnaNadan and PerumNadan, the Erode farmers grow ChinnaNadan. The fertile soils: loamy red and black soils, along with irrigation facility- results in a very high yield of turmeric. The region is often called the ***'Manjal Maanagaram'*** **(Turmeric City)**. Turmeric is also cultivated in several other areas of Erode such as Kangeyam, Annur, and Thodamuthur and the adjoining districts and, and this turmeric is widely called *"Erode Turmeric"***.**

- The Erode Regulated Market, Erode Agricultural Producers Marketing Co-operative Society, Gobi Agricultural Producers Marketing Co-operative Society, and Open market are the major turmeric market channels in Erode. Coimbatore regulated market is also a marketing centre for Erode turmeric. Under the APMC system, turmeric purchase from here is permitted by any trader from across the country, and all the transactions are accounted for under the APMCs in the state. The traders or farmers pay one percent of the market price of turmeric as the market fee to APMC. More than 200 *mandis* are involved in the trade of turmeric.

- As shown in Table 2, Erode district shows considerable shift in area towards turmeric cultivation in 2016-17 when compared to the previous year (2015-16). However, the productivity shows a decline to 5.00 metric tonnes per hectare in 2016-17 from 5.17 metric tonnes per hectare during 2015-16. Low yield is a major reason for the decline in turmeric cultivation in Erode district.

Table 2: Area, Production and Productivity of Turmeric in Erode District (2010-11 to 2016-17)

Year	Area (Ha.)	Production (Tonnes)	Productivity (Tonnes/Ha)
2010-11	14299	92564	6.547
2011-12	12857	65108	5.06
2012-13	10929	46727	4.28
2013-14	8179	40641	4.97
2014-15	6393	35035	5.57
2015-16	7969	41153	5.17
2016-17	9473	47365	5

Source: *Various issues of Season and Crop Report, Directorate of Economics and Statistics, Government of Tamil Nadu*

- The officials of Erode turmeric regulated market indicate that Erode district once had 25% of the turmeric production in the country. It is estimated that around 55 lakhs bags (one bag contains around 80kgs of turmeric) that had come for sales during the year 2012 in the Erode turmeric market, but drastically reduced to around 10 lakhs bags in 2013, and presently, it has further declined to 6 lakhs bag. Despite this fact, the produce from Erode market is unique in comparison with any other markets across the districts and the states.

Findings

- The spread of the varieties and seedlings to other states, especially Maharashtra has negatively affected the state producers. Use of this variety resulted in excellent yields there, which has become a competitor to the traditional areas such as Erode.
- The turmeric traders of Erode are purchasing turmeric in both dry and wet form from the farmers. However, a major portion of the trade (almost 90%) is in dry form of turmeric only. About 95% of the traders are supplying dry turmeric to the commercial curry powder manufactures in India and abroad.
- The content of curcumin in the turmeric, which is the medicinal content, determines the quality of the turmeric and this is in turn determined by the quality of soil and variety/seedlings. Erode turmeric has a curcumin content of 2.5 to 4.5 %. Traders prefer turmeric with high curcumin content given the demand in terminal markets.
- The declining trend in the area and yield of the turmeric cultivation is a major problem for turmeric trading from Erode. Because of the high cost of cultivation with low returns, many turmeric farmers have shifted to more remunerative crops. Besides, cultivation of turmeric is laborious compared to other crops and has a long duration of nine months, and it also requires adequate water for production. The decline in groundwater level is stated as another reason for reduced yields and production of turmeric.
- The General Secretary of a trade union forum in Erode reported that the average cost of cultivation per acre for turmeric comes to Rs.1.80 lakh. Loan Assistance of Rs.71,000/- per acre for production of turmeric is provided by credit agencies which is much lower than the production cost. Besides this, there are harvesting, cleaning and transportation expenses which are rising by 10% every year, and hence, farmers are not getting good returns. In this scenario, only a price of at least Rs.10,000/- per quintal will give profits to the farmers.
- Traders have a common complaint that the farmers have poor knowledge of grading and sorting of turmeric. The turmeric sacks frequently have over 5 percent stones and dust which result in rejection during exports. Else, traders have to spend extra for repeating the cleaning/sorting process of the purchased turmeric before selling it to the processing units which adds to the costs.
- The shelf life of turmeric is generally around 12 months. The stocks often build up in anticipation of better prices leading to stock accumulation, and then there is spoilage due to improper care and poor storage conditions (See figure 3). An official of regulated market reported that of the stock in the market, 80% are old stocks and only 20% is fresh produce. Often stocks as old as five years are coming to the market for sales resulting in prices of only around Rs.5000/- per quintal based on the quality.

Figure 3: Stocked Turmeric affected by pests because of improper storage

Source: *Field Survey, Agro Economic Research Centre, University of Madras, Chennai*

- The farmers are not aware of the pesticides to be used given the nature and intensity of the disease and pests, which results in poor yield, high cost and poor quality.
- The turmeric farmers/traders want the government to establish a special unit of the Spices Board exclusively for turmeric at Erode, which can monitor and give input and information support to farmers to improve both quality and quantity. Such interventions will help create a good demand for the produce in both domestic and international markets.

- The cost of cultivation for organic turmeric is high when compared to that of conventional cultivation. However, it fetches an excellent price in international markets such as Indonesia, Vietnam and China. The major reason for reluctance among turmeric farmers in opting for the organic method is strict testing of produce when exported. When the product fails the test, it loses its value both in the international and the domestic market.
- E-NAM being an online trading platform for agricultural commodities at national level helps both the farmers and the traders in better price discovery. The domestic traders making use of E-NAM prefer trading with the traders from states which sell turmeric at low/ competitive prices. With higher yields and lower cost of cultivation, the prices of turmeric are low in many states when compared to Tamil Nadu. Hence turmeric traders find it difficult to sell the unique Tamil Nadu variety for a good price in the domestic market.
- After an eight year long process, Erode turmeric got Geographical Indication (GI) tag from the Geographical Indication Registry during March 2019, for uniqueness in the quality parameters. Both the farmers and the traders hope that it will have a good impact on the marketing of this unique variety at a global level and can help in fetching better prices in exports.

Recommendations

- Supply of short duration and high yielding varieties of turmeric seeds/ seedlings by the government will help farmers in producing the better quality of turmeric.
- The turmeric farmers and traders have been requesting the government to build a cold storage facility for free use or at a subsidized rate to overcome the major constraint of quality deterioration of stored turmeric.
- The farmers should be educated to use the pesticide the prescribed type and at level through extension workers. Awareness should be increased regarding organic farming and subsidies.
- Training and awareness on producing by-products out of turmeric such as oil, oleoresin, and medicine need to be provided by the Spices Board. It will motivate the farmer to continue turmeric cultivation and bring new cultivators into it.
- High price fluctuation is a major constraint in turmeric marketing. Establishing contract farming between turmeric growers and turmeric processors might be able to mitigate price fluctuations.
- To overcome the labour shortage problem in cultivation of turmeric, labour-saving machinery should be introduced and its awareness should be created.
- Minimum Support Price (MSP) should be offered by the government for turmeric as in the case of other cash crops, to help farmers to continue to cultivate turmeric and with its uniqueness.

Figure 4: A Turmeric Field in Erode

Figure 4.1: Turmeric Processing

Source: *Field Survey, Agro Economic Research Centre, University of Madras, Chennai*

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Effect of Imports on Domestic Prices of Pulses, Oilseeds and Coconut

Brajesh Jha and Deepak Kumar

Introduction

- In an open economy, the prices of some agricultural commodities may often be depressed (even be lower than the cost of production) minimum support price (MSP) for the commodity. In normal agricultural years, this may often be attributed to imports of the commodity. An earlier Agro Economic Policy Brief (AEPB, March 2019) based on a Ministry study on "Evaluation of Price Support Policies" showed that the implementation of price support in some years was unable to maintain market price to MSP levels in some markets.

- In this backdrop, a study was conducted to ascertain the effect of imports on domestic prices of some agricultural commodities. The commodities included three pulses (arhar, lentil, and moong), two oilseeds (mustard, and sunflower seeds) and coconut. Information on wholesale prices and international prices of commodities was collected. The wholesale prices of the above commodities were obtained from secondary sources such as Agmarknet. The wholesale price of a commodity in the present analysis is the average wholesale price in important states which were identified for each commodity based on state-wise production in recent years (2015 to 2018).

- Suitable world prices of the commodities were not available from secondary sources. Therefore, data on imports of the commodities in quantity and value were collected and converted into unit value of imports for the commodity. The month-wise wholesale price and unit value of import were compiled for 15 years from 2003 to 2018. Time series information on the wholesale price and unit value of import was checked for stationarity with Augmented Dickey-Fuller (ADF) test. Following the check for stationarity, Auto-Rregressive Distributed Lag (ARDL) model was used to examine the long-run relationship between the variables.

- The ARDL has several advantages over other similar models for co-integration (Engle and Granger co-integration test and Johansen co-integration test). The ARDL provides efficient results for small samples. It was preferred for variables included in the study which are either integrated of order zero or one, or combination of the both. The estimation of ARDL model requires determination of optimum lag, the same was worked out with Akaike Information Criteria. The ARDL model in a single-equation time series setup was estimated but before its estimation variables were checked for optimal lag values with Vector Autoregression (VAR) model.

- The bound F-test statistic is used to check existence of the long run relationship between variables in the model. If the calculated F-statistic is greater than the appropriate upper-bound critical values, the null hypothesis is rejected implying existence of co-integration. If the calculated F-statistic is below the appropriate lower-bound critical values, the null hypothesis is accepted which indicates that there is no co-integration between the variables. The results are inconclusive if it lies within the lower or upper bound of F statistics.

Findings

- Results of the study show that time series data on wholesale prices and unit value of imports for commodities (arhar, lentil, moong, mustard, and coconut) were stationery at first difference. In sunflower, the unit value of import was stationery at initial level only, though wholesale price of the sunflower was stationery at first level like other referred commodities. The lag length varies (from zero to four) across variables and commodities referred in the present analysis. The bound F statistics in ARDL model were used to check existence of the long run relationship between wholesale price and unit value of import of the commodity. The same is presented below in Table 1.

Table 1: ARDL Bound Test (F-statistics) for Co-Integration

Commodities	F- statistics	Critical Values		
		Significance Level	Lower Bound	Upper Bound
Moong	1.236	1%	6.84	7.84
		5%	4.94	5.73
Arhar	4.369	1%	6.84	7.84
		5%	4.94	5.73
Lentil	4.187	1%	6.84	7.84
		5%	4.94	5.73
Mustard	2.707	1%	6.84	7.84
		5%	4.94	5.73
Sunflower	0.341	1%	6.84	7.84
		5%	4.94	5.73
Coconut	3.142	1%	6.84	7.84
		5%	4.94	5.73

Note: *Authors Calculations*

- As can be seen from Table 1, the calculated F-statistics is less than the lower bound rate at either 1 or 5 percent for all referred commodities (arhar, lentil, moong, mustard, sunflower, and coconut). Therefore, the null hypothesis is accepted which means there is no long-run relationship between wholesale price and unit value of imports for all referred commodities. The findings indicate that import, as captured through unit value of import, has no significant effect on domestic prices of these pulses and oilseeds. The findings go against the impression that wholesale prices of these commodities are depressed (lower than MSP) due to imports.

Conclusions

- The analysis of this study shows non-existence of long-run relationship between world price and domestic price of the selected pulses, oilseeds and coconut. In spite of such findings, prices of commodities in specific market are depressed, and McLaren (2013) found that presence of large intermediaries in agricultural markets lead to a more robust price transmission when world price of the commodity declines rather than when it rises. In addition to this, many studies contradict a long-run relationship between the world price and domestic prices of certain commodities in India. For instance, Ghoshray (2011) studied for rice, wheat, tea and edible oil and he found that wheat and tea display a long-run relationship between international and domestic prices; but such relationship does not exist for rice and edible oil.

- There may be various reasons for this. An examination of import figures for the above commodities shows that imports have happened in certain months of the years only. In the most cases it is not the months immediately after harvest. Perhaps the amount of import is low and has affected some consumer centres only, whereas the wholesale price of a commodity in the present analysis is the average price of the commodity in producing regions. The aggregate figure of wholesale price of the commodity might have failed to capture specific markets. The unit value of imports in the present analysis is the price of commodities at the port; it is CIF (cost insurance and freight) and not DDP (delivered duty paid) price of the commodity. Moreover, some of the above commodities are oils and oilseeds which are used by processers; there is possibility that limited imports do not affect producer of the same (commodity).

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Performance of Pradhan Mantri Fasal Bima Yojana (PMFBY) in Gujarat

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Introduction

- India is an agrarian economy, and agriculture is substantially a gamble in monsoon. As a result, farmers are exposed to a variety of climatic and economic risks. Millions of tonnes of agricultural produce are affected by these risk factors each year across the country. On account of failure of crops, indebtedness, illness, frustration, and family dispute are also increasing among the farming households. Since, agriculture is highly susceptible to natural calamities such as floods, droughts, heavy rains, hailstorm, pests/insects, and diseases, it is important to protect the farmers from the adversities which frequently occur across the country.
- Agricultural insurance is an important mechanism to address the risk of output and income resulting from various natural and human made events. Several crop insurance schemes have been implemented in the country over a period. With the changing needs of the farmers, Pradhan Mantri Fasal Bima Yojana (PMFBY) also know as Prime Minister's Crop Insurance Scheme was launched and implemented since Kharif 2016, replacing National Agricultural Insurance Scheme (NAIS) and modified NAIS.
- The PMFBY scheme compulsorily covers the farmers that avail the seasonal crops loan (loanee farmers), whereas it was optional for non-loanee farmers. (As per the revised guidelines of the scheme, the coverage for loanee farmers is now optional). All major Kharif and Rabi crops are notified under PMFBY. The premium rate of Kharif crops is fixed @ 2% of sum insured to be paid by farmers, while it is @ 1.50% of the value of sum insured for Rabi crops. In case of commercial and horticultural crops, 5% of the sum insured is to be paid by the farmers as premium. From sowing to threshing of crops, everything is covered under PMFBY. It is a new scheme which had been uniformly started throughout the country. Several agencies are involved in the process of PMFBY. In Gujarat, for Kharif season- 2016, two insurance companies namely; Agricultural Insurance Company (AIC) and HDFC Ergo were involved for implementation of the scheme and for Rabi season 2016-17, United India Insurance Company (UIIC) was involved for implementation of the scheme.
- The present study was undertaken to assess the performance and functioning of the PMFBY scheme in Gujarat. The study was conducted in two phases. In the 1st phase, the process of implementation at the state level was comprehensively mapped. In this exercise, nine AERCs were involved including AERC, Vallabh Vidyanagar. The study involved mixed methods involving both secondary and primary sources of data. The phase I study was intended to focus mainly on performance of PMFBY and implementation issues in the state. As per the stated distribution, a total of 150 households were covered under the detailed survey. Out of 150 households, 110 households were loanee farmers (beneficiary farmers), 10 households were non-loanee farmers and another 30 households were control farmers meaning they had not taken crop insurance. In the phase II, two districts (Anand and Vadodara) were selected for the survey. From each of the districts, 72 households were selected from two blocks and 6 villages each. In total, 144 households were selected from 12 villages covering 4 blocks of two selected districts.

Findings

- In Gujarat, around 4 lakhs of farmers were insured with 6.8 lakh hectares area under PMFBY in the year 2016-17. Among the implementing agencies, AIC cluster has covered major share of the farmers. There was a common complaint about the earlier schemes that they provided cover on crop loans rather than on crop losses, and the participation rate of non-loanee farmers was very low. Hence, more emphasis was given on the coverage of non-loanee farmers under PMFBY.
- Among the total farmers covered during Kharif 2016 season, around 0.02 lakh farmers were non-loanee farmers. Around 10 percent share in premium was paid by farmers for Kharif season whereas during Rabi season, around 45 percent share in premium was borne by the farmers during 2016-17. Rest of the premium in the two seasons was paid by the State and the Union Government jointly.
- Though the coverage under new scheme has increased, several factors have contributed to the scheme slowing down. Some of them are insufficient time for enrolment, disputes between

the states and insurance companies on yield data and compensation resulting in delay in settlement, and more focus on impractical targets/goals without much stress on quality of implementation. The Union government has been citing reason of poor implementation by the states for the lackadaisical response to the scheme. State officials say that the bid of private insurance companies for more profit and delay in settlement of claims are crucial factors for the decline.

- Among different kinds of events of losses in cotton crop, the highest of 53.0 percent of event of losses were due to drought, dry spells, flood, pest attacks and diseases etc.; while 20.5 percent of event of losses were because of prevented sowing/planting due to deficit rainfall or adverse weather and remaining events of losses were due to post-harvest losses, localized calamities (cyclone and landslide).
- As far as compensation received from insurance companies is concerned, on an average of Rs. 13,523 and Rs. 15,480 were paid to the cotton farmers against the crop loss for loanee insured farmers and non-loanee insured farmers respectively. Thus, the compensation for crop losses was more to the non-loanee farmers compared to the loanee farmers.
- Average premium paid by loanee and non-loanee groundnut farmers was Rs. 1,323 and Rs. 1,470 per household respectively. In case of loanee farmers, about 90.0 percent events of losses were because of drought, dry spells, flood, pest attacks, and diseases etc. and remaining events of losses were due to prevented sowing/planting due to deficit rainfall or adverse weather. In case of entire non-loanee insured farmers, the crop yield loss was due to drought, dry spells, flood, pest attacks and diseases etc.
- As far as compensation received from insurance companies is concerned, an average of Rs. 34,039 and Rs. 23,220 were paid to the groundnut grower farmers against the crop loss for loanee insured farmers and non-loanee insured farmers respectively. Thus, the compensation for crop losses was much higher in case of loanee farmers compared to non-loanee farmers.
- Assessment of the overall experience of sample farmers with PMFBY reveals that about 36.4 percent loanee insured farmers reported that they were never insured under old crop insurance scheme, 45.5 percent of them mentioned that PMFBY is better than earlier schemes whereas 70 percent non-loanee insured farmers opined that it is better than earlier schemes.
- Among the loanee insured farmers, about 31.8 percent farmers suggested to provide timely compensation, 22.73 percent suggested for more accurate assessment of crop losses, and 18.1 percent expressed the need of more awareness about the crop insurance scheme. About 8.1 percent suggested to reduce official complexity and emphasized on less time and less paperwork for enrolment and claim disbursement.
- Regarding the extent of awareness about PMFBY and the non-uptake of the same by the control farmers, it is revealed that, about 73.3 percent of the control farmers had heard about PMFBY and 26.6 percent had no idea about PMFBY. As regards the sources of awareness, about 43.3 percent, 16.6 percent, 10 percent and 3.3 percent of control farmers got the information about PMFBY from cooperative society, media, farmer's friend and *gram sevak r*espectively. About 33.3 percent of control farmers expressed that they are not interested in this scheme, while 20 percent of them believed that the claim settlement process is tedious. About 13.3 percent of them believed that they may not get compensation due to crop losses, whereas only 6.7 percent farmers expressed that no sufficient time was there for getting enrolled for the crop insurance, even if they were interested to get enrolled for the same.
- The extent of willingness to pay for crop insurance products and services was assessed by the use of discrete choice experiments (DCEs), which is an attribute-based survey method for measuring benefits (utility). Since it was an entirely different kind of experiment where the name of PMFBY scheme was not disclosed, entirely new set of sample households were surveyed from the sample districts of Gujarat. However, all farmers were asked to share their experiences of enrolling for PMFBY after the end of the experiments. In total, 144 farmers were chosen for the experiment from 12 villages of 4 talukas of 2 districts (Anand and Vadodara) of the state.
- The results from estimating the utility function (a generalized multinomial logit function) reveal that all the estimated coefficients of variables such as sum insured, the certainty of payment, insurance coverage, and loss determination are statistically significant at one percent level of significance. Thus, all these factors significantly influence the willingness to pay for the crop insurance. It is found that a farmer would be willing to pay Rs. 889 on an average for increase in the certainty of payment made to him as against the base category.

- The analysis on the willingness to pay for an attribute on several household characteristics like age, farming experience, caste, gender, etc. with Ordinary Least Square regression revealed some interesting results. The study finds that, for 'Coverage: Pre-Planting', if the area cultivated in Kharif 2017 rises by 1 acre then the willingness to pay rises by Rs. 621 on an average. Likewise, if age of the farmer rises by 1 year, then he would be willing to pay Rs. 617 on average extra for 'Coverage period: Sowing to harvesting'.

Conclusion and Recommendations

- It was observed that this scheme was better than NAIS because lesser premium was paid by farmers and claim settlement process was more scientific which was decided through crop cutting experiments (CCEs) data. For main crops, CCEs were conducted at Gram Panchayat level and for other secondary crops, CCEs were conducted at block level.
- However, there are a few areas where the present scheme can be further improved. There is a need to address issues such as delay in claim settlements; generating sufficient awareness in farmers about formulation and implementation of risk reduction strategies, developing suitable crop insurance product and effective implementation strategies and infrastructure, investing in R&D on insurance product design in collaboration with private insurance service providers, substituting relief payments with crop insurance system, and covering the price risk along with weather risk. Based on findings of the study and interaction with various stakeholders, following suggestions are made for improving the adoption and performance of the PMFBY in Gujarat.
- At present, the scheme covers major food crops (cereals, millets and pulses), oilseeds and annual commercial/ horticultural crops. It is suggested that the perennial horticultural crops should also be included under the scheme.
- Pests and diseases come under preventable risks, and insurance companies do not consider claims where losses occur due to pests and disease. Thus, it is necessary to clearly define the non-preventable risks or disease and pest should be considered as non-preventable risks. The unseasonal rain should be defined clearly in the operational guidelines of PMFBY.
- Localized calamities are required to be clearly defined because insurance companies categorically deny the claims under local risks. Some of the risk factor like crop losses through wild animals should be incorporated into the guidelines. The operational guidelines should be in local languages for better understanding of the farmers.
- Majority of farmers do not have proper knowledge about crop insurance. Even the farmers do not know that they have been insured under the scheme. The farmers are unaware that the amount of crop insurance premium is automatically deducted from their account. Thus necessary awareness programmes should be organized periodically.
- In the case of loanee farmers, the premium amount deducted is stated in their Saving Bank Passbook. In some other cases, the same has not been stated in Bank Passbook. Thus, some farmers suggested that the premium deduction receipt should be provided to them for their record. There should be a document provided to the farmers like premium deducted receipt, insurance document, crop loss coverage criterion, guidelines, contact list of company etc., which will help them at the time of loss assessment and claim settlement.
- Some farmers complained that they were not given compensation even if they had incurred heavy crop losses due to no loss assessment or delayed loss assessment. In that case, farmers demanded that the amount deducted as a premium should at least be given back to them since the claim was not settled by the respective company. In the case delay in claim settlement, the additional interest amount should also be paid to the farmers.
- The control farmers expressed that they could not avail crop insurance since the land settlement was in process. Some of them came for enrolment after the due date. They suggested that timely information should be passed on to them. They further suggested that the paperwork and official procedure should be reduced or simplified for the successful implementation of the crop insurance scheme.
- It is also clear from the discussion that PMFBY would not be sufficient to cover all the risks arising from agricultural activities. To protect farmers against various kind of risks, a comprehensive risk mitigation strategy needs to be planned in addition to crop insurance.

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Implementation of Hail Protection Mechanism Schemes for Apple Crop in Himachal Pradesh

Arvind Kalia, Vamika Darhel, Nisha Devi Sadrate

Introduction

- Horticulture has developed as a lucrative occupation and business proposition in the state since long and has witnessed a continuous rise in area and production of fruits. Apple is the most important fruit crop of Himachal Pradesh, which constitutes about 49 per cent of the total area under fruit crops and about 85 per cent of the total fruit production. The area under apple has increased from 400 hectares in 1950-51 to 3025 hectares in 1960-61, 111896 hectares in 2016-17 and 112500 hectares in 2017-18.

- There has been a phenomenal increase in the area and production of apple, but the productivity of apple is low as compared to other apple-producing countries in the world. Many factors are responsible for this. In the last decade, the incidence of hailstorm has increased alarmingly, which has often destroyed apple crops worth crores of rupees in the state. Thus, to protect the apple crop from hailstorms, orchardists of the state are using hail protection mechanism/ methods such as anti-hail cannons and anti-hail nets.

- Table 1 and Figure 1 shows the district wise production (in million ton) of the apple crop in the state from the year 2009-10 till 2017-18. In all these years highest production of apple has been in district Shimla, both in absolute and relative values. The second highest area was in district Kullu followed by district Kinnaur. District Una had no production of apple in the state. Highest production district (Shimla) has seen an increasing trend in production of apple, as it was 1,71,945 MT in 2009-10, which increased to 2,51,897 MT in 2017-18. Same is true for the total production of apple in the entire state, which increased from 2,80,105 MT in 2009-10 to 4,46,574 MT in 2017-18.

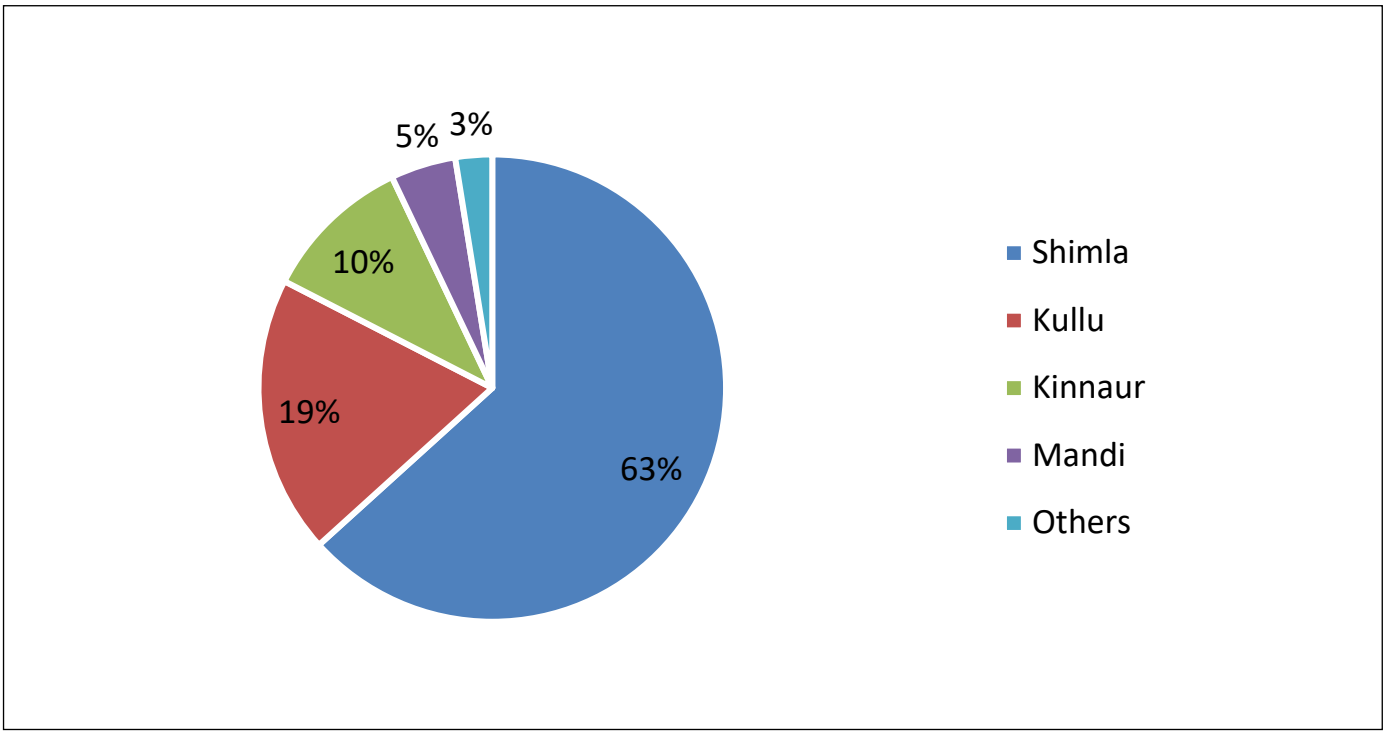
Table 1: District-wise Production of Apple in Himachal Pradesh during 2009-10 to 2017-18

(In M.T)

Districts	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	Total Production (2009-10 to 2017-18)	Percentage share of total production (2009-10 to 2017-18)
Shimla	171945	602684	168634	259779	499422	407751	482388	265987	251897	3110487	63.28
Kullu	54385	191212	44619	87906	152654	104589	143475	89570	78948	947358	19.27
Kinnaur	40289	63781	53290	52020	54044	59196	75202	60210	52189	510221	10.38
Mandi	8659	22315	4417	9015	24229	24709	48608	38344	42078	222374	4.52
Others	4827	12120	4076	3675	8374	28954	27453	14023	21462	124964	2.54
Total	**280105**	**892112**	**275036**	**412395**	**738723**	**625199**	**777126**	**468134**	**446574**	**4915404**	**100**

Source: *Directorate of Horticulture, Navbahar, Shimla, Government of Himachal Pradesh.*

Figure 1: District wise share of total production of Apple from 2009-10 to 2017-18



Source: *Directorate of Horticulture, Navbahar, Shimla, Government of Himachal Pradesh and Authors Calculations.*

- There are two types of mechanism: anti-hail cannons and nets used to protect apple crops from hailstorm in the state. Hail protection mechanism is mostly installed and used in Shimla district.
- Anti-hail cannon is known as the modern device to control hailstorms in apple areas. This device generates energy through shockwaves from its neck caused by the fire shots that disperse hail causing clouds and melts hailstones into rain or thin sleet. It was first introduced by state government through the Department of Horticulture and was imported. The Department of Horticulture installed three anti-hail cannons on pilot basis under central funded project worth Rs. 3.29 crore in the state during 2010-11. These cannons were installed at three different places; Kathasu in Jubbal tehsil, Braionghat in Kotkhai tehsil and Deorighat in Rohru tehsil of district Shimla. Total installation cost of these three anti-hail cannons was Rs. 1,42,62,000.
- Anti-hail net is an old mechanism which protects orchards from hailstorm by covering the tree like an umbrella by standing on a strong structure that supports its weight above the plants. This type of mechanism is not provided by state horticulture department, but farmers purchase anti-hail nets from private retailers and government provides some financial assistance/subsidy on this mechanism.
- For the study, multistage purposive cum random sampling technique was used in the selection of districts, revenue villages and orchardists. Jubbal and Kotkhai block had the highest number of cannons installed and highest area covered under nets. Hence these blocks were selected. Similarly, based on highest area under nets, Thanedhar block was selected for the study of impact of Anti-hail nets. A total sample of 120 farmers was selected. In Jubbal and Kotkhai block ,45 were cannon users and 15 non-users. For Thanedhar block, 45 were net users and 15 non-users. The survey was conducted through personal interview with the farmers.

Figure 2: Images of Anti-hail Nets

Source: *Amar Ujala https://bit.ly/34zRK0M*

Findings

- In Jubbal & Kotkhai block of district Shimla, farmer committees were formed by the orchardists themselves, to monitor the functioning of privately installed cannons in their areas during 2016. To protect fruit crops, especially apple, from hailstorms the state government enhanced subsidy on anti-hail nets from 50 per cent to 80 per cent during the year 2015-16.
- Jubbal & Kotkhai block had accounted highest area and production among all 10 blocks of the district during all years (2009-10 to 2017-18) followed by Rohru and Narkanda blocks, respectively.
- The horticulture department provided 80 per cent subsidy to farmers for their purchase of anti-hail nets and maximum limit for availing assistance was restricted to 5,000 square meters per beneficiary/ family. However, there was no provision for availing assistance on anti-hail cannon before 2018. Ever since the state government introduced 60 per cent subsidy on the Cannons.

Recommendations

- Cultivation of apple crop is the primary source of income for majority of sampled orchardists. As hailstorms were reported to be the biggest cause of loss to apple crop, special emphasis should be paid on protecting the apple crop from these kinds of losses (particularly hailstorms) and to increase its production and sale.
- As department of horticulture is the main implementing agency for monitoring, the government installed anti-hail cannons; it does not assist with installation or operation of the privately installed cannons. It would be recommended to help orchardists who have installed cannons through private source by undertaking the financial and physical aspects of the functioning.
- The government can keep the management in the private hands by letting the orchardists operate the cannons, but provide financial help by fully funding the installation and annual operation costs like the costs of cylinder refills, labour costs etc.
- Orchardists face a lot of troubles in installing and uninstalling these nets every year in their orchards. Hence, the horticulture department could help by providing suitable net structures and help organized well trained/professional labour force every year, to make the use of anti-hail nets more efficient.

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