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Aiding the Future of India's Farmers and Agriculture



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For kind attention of:

The Hon'ble Prime Minister's Office,
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COVID-19 and Sugarcane Farmers: Impact on Harvesting and Transportation¹

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Introduction

- Sugarcane is an important cash crop which serves as a raw material to various sectors of the economy. Transportation and harvesting costs are essential components of the overall cost structure of sugarcane. However, there is no reliable data of these costs for the sugarcane crop in the country at present.
- The Commission for Agricultural Costs and Prices (CACP) provides data on various input costs such as seed, fertilizer, irrigation, labour, land rent, machinery, and few others for sugarcane. However, the data on transportation and harvesting costs are not being collected under this scheme.
- The present study is an attempt to fill this gap. The study provides estimates of the cost of sugarcane harvesting and transportation based on an in-depth primary survey of farmers, sugar mills and other stakeholders in the major sugarcane producing states.
- The study also assessed the problems and constraints faced by sugarcane farmers during the recent lockdown period through a telephonic interview.
- The cost of harvesting and transportation begins to increase towards the end of February and early March as the summer begins. The availability of labour becomes a major issue after that period, and the labour cost also increases. The cost of the contract for harvesting and loading ranges from Rs. 38 to Rs. 64 per quintal. This is comparable to the cost of 'self-arranged' harvesting and loading by farmers, which is about Rs. 54 per quintal. Various other costs, which cannot be directly measured, are involved in harvesting. These costs vary across states and usually inflate the harvesting cost.
- The main problems associated with the harvesting are (i) shortage of labour; (ii) delay in payments; (iii) inability to use mechanized harvesting due to high cost, sowing norms and structure of fields; and (iv) incidents of exploitation of farmers by the middlemen (labour contractor, drivers etc.).
- The initial phase of COVID-19 started when the sugarcane harvesting was at its peak. This was also the time for manual planting of sugarcane in north India. The impact of COVID-19 and lockdown has been analyzed in terms of availability of labour, disruption of supply chains, transportation bottlenecks, problems faced by the sugar mills, market demand for sugar and prices. The feedback on these aspects has been elicited from all the important stakeholders through telephonic interviews.

Findings

Harvesting

- At some places, harvesting is completely performed manually, either by family labour or hired labour (contract or daily wages). The farmer harvest and bring a pre-fixed quantity of sugarcane to the sugar mills or purchase centres during a designated period.
- Majority of the sample farmers reported having an adverse effect of lockdown. A large number of farmers (94%) indicated that they were unable to harvest the crop due to a shortage of labour. Majority of sugarcane farmers (87%) foresee labour problems in the upcoming Kharif season. The main problems foreseen by the farmers are non-availability of labour and higher wages due to high risk and fear of infection. The other problems

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expected in the ensuing season are (i) inability to visit markets to purchase agricultural inputs, (ii) inadequate cash to buy inputs, (iii) lower prices for the non-MSP crops, and (iv) closure of seed and fertilizer shops.

Transportation

- The distance is a major determinant of the mode of transport and cost. The prevalent modes of transportation are manual and mechanized. The manual carts are used for shorter distances when the distances of the mill or purchase centre is less than 5 km, and the cost of carrying the produce is relatively low. The tractor-trolley is the most popular mode of transportation among farmers and two-thirds of the total quantity sold is transported by tractor trolleys. The cost of owned mechanized transportation, which includes costs on fuel, wages and maintenance work out to about Rs. 18.5 per quintal.
- While hiring, farmers prefer 'complete hiring' to partial hiring. In complete hiring, all the costs (fuel, labour etc.) are borne by the service provider. In partial hiring, only the vehicle rent goes to the provider while the farmer bears all the costs. The costs of 'partial hiring' and 'complete hiring' are estimated as Rs. 19.6 and Rs. 26.5 per quintal, respectively. Key problems involved in transportation are long waiting time in queues at mill gates due slow processing at mill gate, traffic jams, factory break down, etc. These delays cost them heavily in terms of time and money.
- During the lockdown, public transportation was affected. However, there was no restriction for the movement of agricultural commodities. Therefore, farmers faced limited problem (26%) related to restrictions on transportation during COVID-19 lockdown phase.
- Post-harvest issues are critical in the supply chain of agricultural commodities. Ramakumar (2020) reported that the crises in harvesting and marketing of agricultural commodities have led to a fall in the farm prices of a range of commodities,

specially perishables.

- On marketing of other agricultural commodities, nearly two-thirds of the farmers did not face any problem. However, there were few exceptions, who reported following problems (i) trading by a limited number of shops, (ii) limited market arrivals, (iii) lower demand and prices due to the limited number of buyers, and (iv) poor quality of produce due to crop damage.

Problems related to the functioning of sugar mills

- The different kind of regulations have adversely affected the competitiveness and growth performance of mills and therefore led to delayed payment to sugarcane farmers (Shroff and Kajale 2014). Farmers did not get any additional support or facility from the mill during the lockdown period. Farmers reported the situation was 'business-as-usual' (60% farmers). However, the remaining 40% of farmers were dissatisfied and felt that 'things got worse than before' during the lockdown. The delay in receiving payments is the most severe problem reported (86%).
- Some other problems faced by farmers include (i) sugar mills or their centres were not functioning regularly, (ii) long waiting time at the sale points, (iii) delay in receiving dispatch slips, (iv) mill closed temporarily, (v) early closure of mill gates, (vi) loss of cane as no uniform period for receiving slips, and (vii) inaccurate weighing system. In fact, many of these problems were prevalent even before COVID-19, but their severity aggravated during the lockdown period.

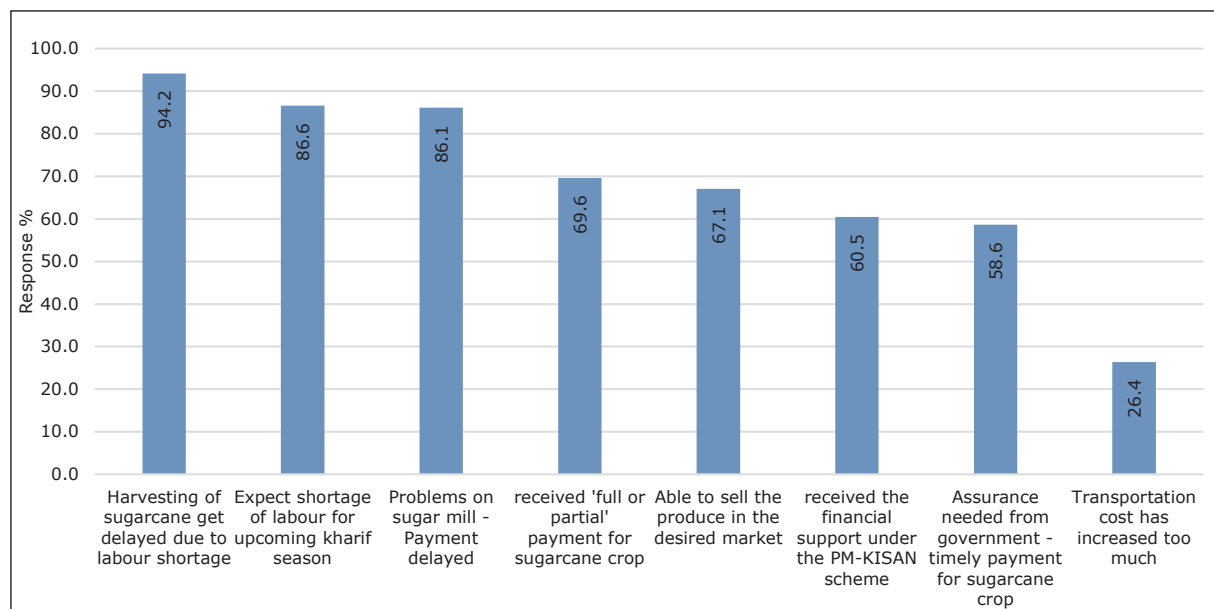
Farmers' expectations from the government

- Varshney et al. (2020) found that the PM-KISAN scheme has significantly helped those farmers, who are more dependent on agriculture and have poor access to credit. The direct financial support to the vulnerable sections will help the consumption flow (Carberry and Padhee 2020 and Dev 2020). In our survey, the majority of

the farmers (61%) have received Rs. 2000 as the direct-cash-transfer under the PM-KISAN scheme as an advance installment. It provided a big relief to the farmers to meet expenses for agricultural activities during the lockdown.

- Majority of the farmers demanded government’s intervention for timely payment for sugarcane crop (59%); assurance on adequate labour availability at lower wages; agricultural inputs at subsidized rates; and timely availability and sufficient quantity of fertilizers.

Figure 1: Responses from sugarcane farmers on the impact of COVID-19



Source: Author’s computation from field survey data.

Recommendations and Conclusion

- Labour scarcity in sugarcane is a major concern. There is a need to develop appropriate machines to harvest sugarcane, especially in areas where labour is scarce.
- There is a scope to develop an effective and transparent mechanism of ensuring timely payment of sugarcane dues to the farmers.
- The functioning of sugar mills was erratic during the lockdown period. Non-availability of labour in the mills was also a problem. Besides, there are administrative, management, financial and operational problems in better functioning of sugar mills. Modernization and mechanization of sugar mills will improve their efficiency.
- The quick disposal of advance instalment of PM-KISAN supports the suggestion that some of the subsidies may be amalgamated with the direct

cash transfer scheme to benefit the farmers.

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Information and Utilization of Minimum Support Price Policy (MSP) among Pulses Producing Farmers in India

Poornima Varma

Introduction

- Pulses play a pivotal role in a country like India for all categories of people due to its rich protein content. The protein content in pulses is double the protein content of wheat and three times more than that of rice. The vital role played by pulses in the agriculture system, and the diets of people make it an ideal crop for achieving food and nutritional security, reducing poverty and hunger.
- Despite being the largest pulse crop cultivating country in the world, the production of pulses is not commensurate with the demand. The two reasons for this poor performance are firstly, the area under pulses is rain-fed, and secondly, pulses are mainly grown as a residual crop on marginal lands.
- Farmers are not motivated to produce pulses owing to high production and price risk and also due to lack of effective procurement. As a result, pulses witnessed a drastic decline in India, especially during 1960-70s, and this regime also coincides with the spread of green revolution in cereals. During this period, the area under pulses was acquired by cereal crops leading to a decline in area under pulses and yield improvement in cereals and made cereal crops relatively more competitive. The stagnation in productivity, production and price uncertainty resulted in the decline per capita net availability of pulses in the country over the years. The persistent deficit and

the soaring domestic prices made it inevitable for the country to import pulses, making India the largest importer of Pulses.

- An interesting pattern of consumption that has been observed for pulses in India is that there is minimal substitution among different types of pulses. In order to provide an impetus to pulses production, the Government of India decided to increase the MSP for pulses. The MSP recommended by the CACP shows a continuous increase in the MSP for major pulses in the last five years. Against this background, the study attempts to analyze the factors influencing the access to information about MSP and availing of MSP by pulses producing farmers.

Pulses Production scenario and Minimum Support Prices

- The latest available data shows that the production of pulses in India was 17.15 million tons in 2014-15, which declined to 16.35 million tons in 2015-16 and further increased to 22.14 million tons in 2016-7. There could be several factors that might have contributed to short term increase in pulses production, including the government interventions such as the National Food Security Mission (NFSM), favourable rainfall and few others. The MSP recommended by the CACP also shows a continuous increase in the MSP for major pulses in the last five years. Among the major pulses, the compound annual growth rate in the

MSP for Tur, Gram, Moong and Urad has been higher than that of cereals. However, the existing studies show that the procurement of pulses has been negligible at about 1 to 4 per cent of the production of pulses compared to 28 to 30 per cent of cereals during 2012-13 to 2014-15 which forced farmers to sell their crops at a loss.

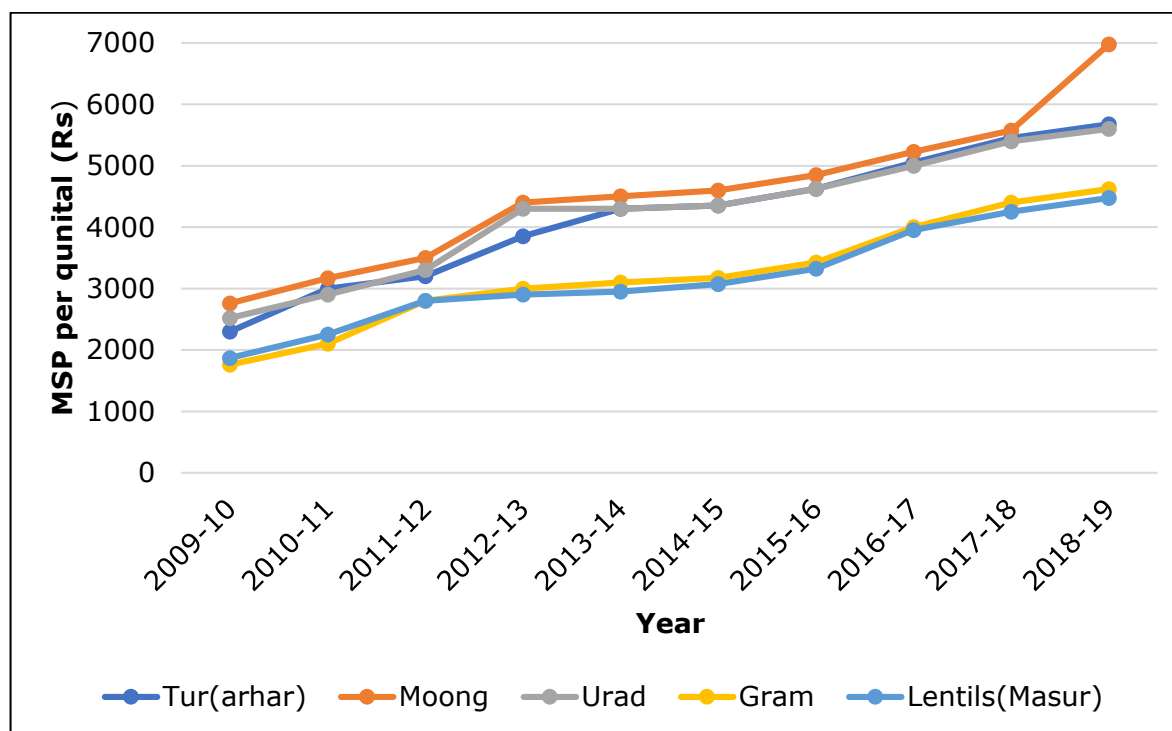
- The MSP announced for various pulses is given in table 1. The MSP figures shows that there has been an increase in the MSP for almost all the crops. The MSP for Pigeon pea (arhar) increased from Rs 2300 per quintal in 2009-10 to Rs 5675 per quintal in 2018-19. Similarly, the MSP for gram increased from Rs. 1760 in 2009-10 to Rs 4620 in 2018-19 (see table & figure 1).

Table 1: Minimum support prices of various pulses in Rs per quintal

Crops	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Kharif										
Tur (Arhar)	2300	3000	3200	3850	4300	4350	4625	5050	5450	5675
Moong	2760	3170	3500	4400	4500	4600	4850	5225	5575	6975
Urad	2520	2900	3300	4300	4300	4350	4625	5000	5400	5600
Rabi										
Gram	1760	2100	2800	3000	3100	3175	3425	4000	4400	4620
Lentils (Masur)	1870	2250	2800	2900	2950	3075	3325	3950	4250	4475

Source: CACP

Figure 1: Minimum support prices of various pulses in Rs per quintal (2009-2019)



Source: CACP

- The study focused on two major pulses produced in the country, and they are Chickpea and Pigeon

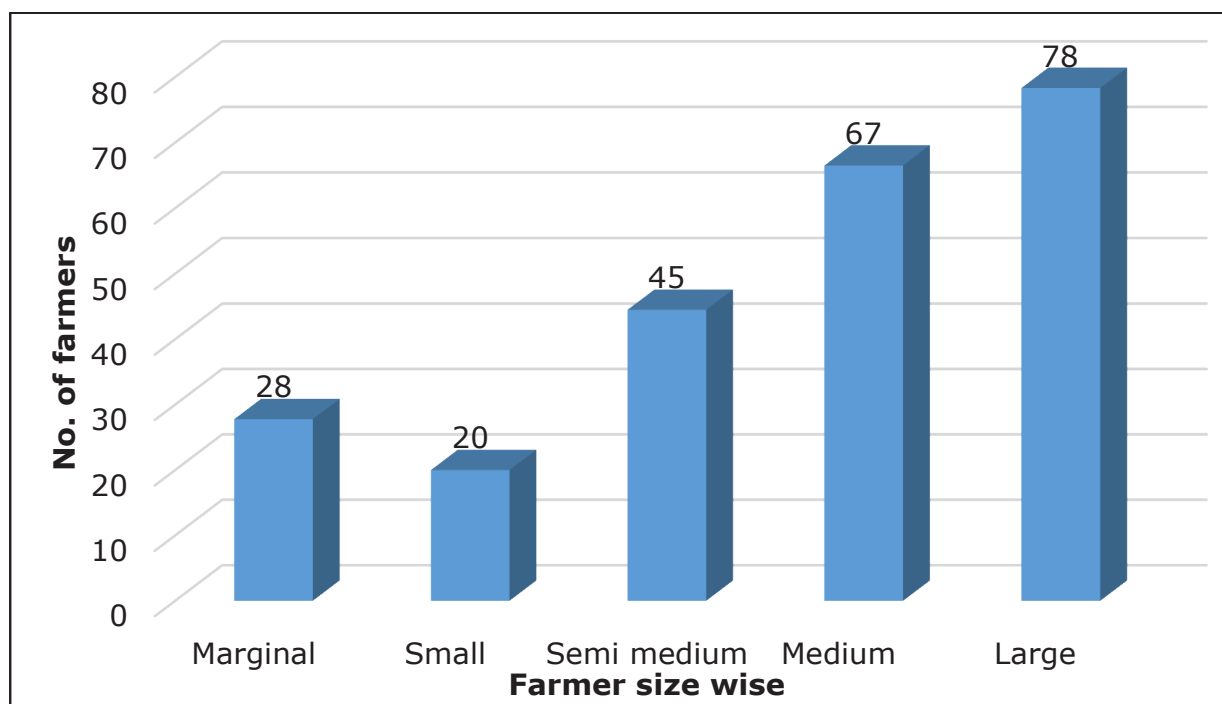
pea. A comprehensive household survey was conducted in three major pulses producing

States and its districts-Karnataka (Gulbarga), Madhya Pradesh (Narsinghpur) and Maharashtra (Wardha). A random sample of chickpea and pigeon pea producing farmers were selected from each district. The total number of households surveyed was 572.

Findings

- The descriptive analysis of the household data showed that households with access to extension services were only 43% in the total sample households. The state-wise percentage of access to extension services in the sample households showed that households in Wardha (Maharashtra) had greater access to extension services (78%). The access to extension services was lowest among the households interviewed in Gulbarga (Karnataka) (8%). The percentage of households with access to extension services in Narsinghpur (Madhya Pradesh) was 43%. Farm size-wise access to extension services among the sample households showed that the access to extension services was highest for semi medium farmers (82%) and this was followed by medium and large farmers, 50% and 48% respectively. Access to extension services was the lowest for marginal farmers (22%).
- As far as the training received from the government department or NGOs are concerned, only 19% of the sample households had received any kind of training. Training received from government departments or NGOs were also highest in Wardha (Maharashtra) (35%) and lowest in Gulbarga (Karnataka) (5%). The training received was 16% in Narsinghpur (Madhya Pradesh). The size wise percentage of farmers who received the training showed that large farmers had received more training (around 25%). The training was relatively higher for semi medium (21%), medium (22%) and large farmers (25%) as compared to marginal (11%) and small (6%). The training was the lowest for small farmers. The poor access to training and extension services were reflected in the information regarding MSP received by households.
- In our sample, only 51% of the sample households had information about the MSP. Information regarding the MSP was the highest in Madhya Pradesh, possibly due to the highest share of medium and large farmers in the sample from Narsinghpur (Madhya Pradesh). The information was the lowest in Gulbarga (Karnataka). Contact with extension services, access to training, knowledge of government schemes or new production techniques, crop diversification were also the lowest among the sample households from Gulbarga (Karnataka). It shows that the disadvantage faced by all these had a direct link with access to information regarding MSP.
- Despite having higher access to training, extension services and knowledge about new production techniques, the information of MSP received by households in Wardha (Maharashtra) was lower than that of Narsinghpur (Madhya Pradesh). In Wardha (Maharashtra), around 52% of the sample households had information about MSP, whereas, in Narsinghpur (Madhya Pradesh), around 94% of sample household had information about MSP. Again, this could be partly due to the high share of medium and large farmers in the sample by Narsinghpur (Madhya Pradesh).
- The reason why Narsinghpur (Madhya Pradesh) had the highest share of sample households with information regarding MSP is also clear from the below figure 2. Medium and large farmers had greater access to information, and the size of medium and large farmers in the sample households was the highest from Narsinghpur (Madhya Pradesh) as compared to the other two States. Access to information was increasing as the farm size increases. The access to information, however, was the lowest among the small farmers in the sample (see figure 2).

Figure 2: Farm Size Wise Information about MSP (in%)



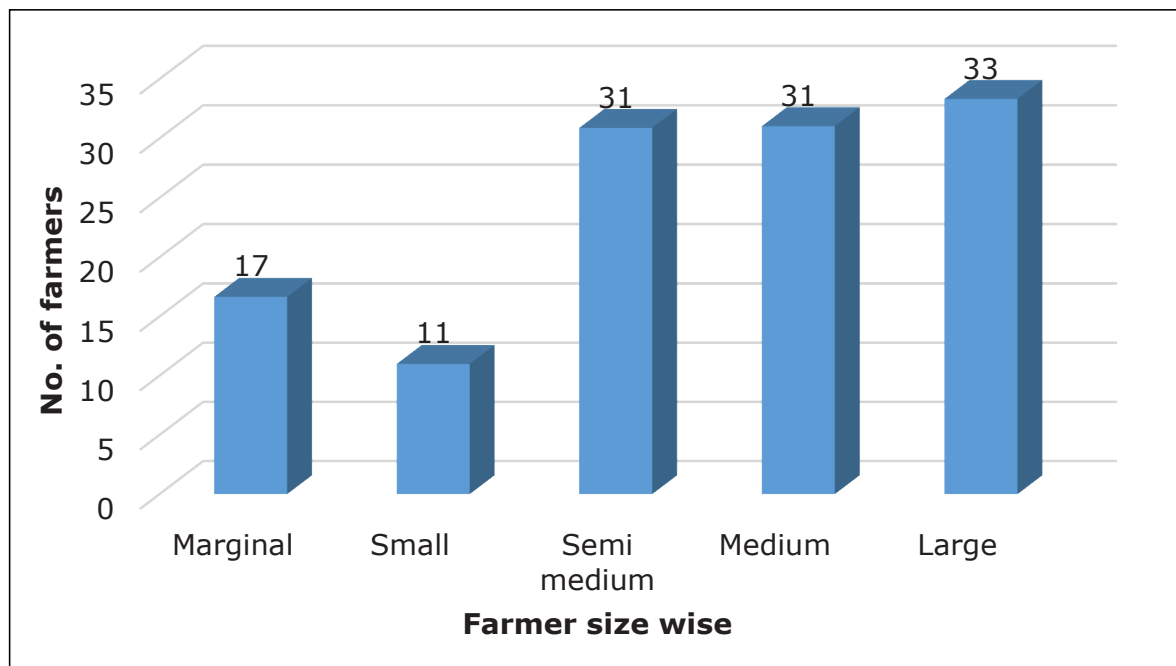
Source: Survey Data

- Interestingly, though households in Narsinghpur (Madhya Pradesh) had the highest information about MSP, households availing MSP was much lower and lower than Wardha (Maharashtra). In Maharashtra, almost all farmers who had information about MSP availed MSP. The percentage share of households with information was 52%, and utilization was 50%. The poor access to information by households in Gulbarga (Karnataka) were also reflected in the poor utilization of MSP by these households.
- The percentage share of households in each farm size category who were availing MSP was the highest among semi-medium, medium, and large households. The percentage share of households who were not availing MSP was the lowest among small farmers (see figure 3). Though 78% of large farmers had information about MSP, only 33% of large farmers availed MSP. Similarly, 67% of medium farmers had information about MSP, but only 31% availed MSP.
- Briefly, the descriptive analysis based on household data showed that percentage of pulses producing farmers who have information about MSP and those who are availing MSP were very less. The farmers who sold the crop to procurement agencies were also less.
- The results from the conditional (recursive) mixed process equation model analysis showed that Madhya Pradesh had greater access to information about MSP as compared to other states. This was also seen in the descriptive analysis of the socio-economic profile of the sample households in the previous section. However, the utilization of MSP was more in Maharashtra. Education and training received by farmers from government departments or NGOs had a positive and significant impact in accessing the information regarding MSP. Whereas distance to market and therefore less access to market reduced the access to information. The variable for pigeon pea farmer also came out to be significant and negative. This indicates that Pigeon pea farmers had less probability to receive information. Information access was less in Karnataka and had a greater share of pigeon pea farmers in our sample.
- As far as the utilization of MSP is concerned those who are cultivating other crops or in other words

more diversified farmers had a lower probability to avail MSP. This could be the reason for statistically significant and negative relationship between utilization of MSP and cultivation of other crops. This can also be the reason why large farmers in Madhya Pradesh despite having greater access to information about MSP is not availing MSP. This can also be the reason why the dummy variable

for only Maharashtra came out to be significant in the utilization model. Age of the farmer had a significant and negative relationship with the utilization of MSP. Similarly, education of the farmer increased the chances of availing MSP as the relationship between the education variable and utilization of MSP was positive and statistically significant.

Figure 3: Utilization of MSP Farm Size Wise (in%)



Source: Survey Data

- Similarly, those farmers who sell their crop in APMC also had a greater probability to avail MSP. Those farmers who receive training had greater probability in receiving information as well as in availing MSP. The risk factor increased the probability to avail MSP. This is an interesting result. The variable number of crop failure in last five years had a positive and statistically significant relationship with availing MSP. The market access came out to be as a significant factor in availing MSP. Those who have less market access had a lower probability to avail MSP. The variable distance to market came out to be negative and statistically significant in our analysis. Interestingly, the probability of chickpea and pigeon pea farmers in availing MSP was also negative and statistically significant.

Conclusion and Recommendations

- The study analyzed the factors influencing the access to MSP information and the decision to avail MSP. The results showed that the high information about MSP did not result in greater utilization of MSP in Madhya Pradesh partly due to an increased crop diversification among the sample households from Madhya Pradesh. The results, therefore showed that crop diversification results in lower utilization of MSP for pulses.
- Market access came out to be as an important factor in helping farmers to receive information related to MSP and in availing MSP. The risk faced by farmers also increased the chances to avail MSP, and this points out how important MSP is in mitigating the negative effects of risk. The study, in general points out the information asymmetry

with respect to MSP and the importance of MSP for poor farmers who predominantly cultivate only pulses.

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Impact Evaluation of Farm Debt Waiver Scheme on Farmers Livelihood in Uttar Pradesh

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Introduction

- In terms of farmers income, the state of Uttar Pradesh ranks 13th among the states of India. The average income of a farmer in Uttar Pradesh is Rs 4,923 per month which is lower than the national average income of Rs 6,426 per month. Also, an average monthly consumption expenditure of Rs 6,230 pushes an average farmer of Uttar Pradesh into a deficit of Rs 1,307 in each month.
- Keeping in mind the situation and other factors, the Government of Uttar Pradesh chalked out a plan to provide timely relief to the distressed farmers. Thus, formulated a crop loan redemption scheme for marginal and small farmers and named it as Farm Debt Waiver Scheme. This scheme is an investment for empowering the marginal and small farmers to alleviate their hardship and rejuvenate their agriculture. Also, the increased dependence of farmers on credit to meet out the rising cost of cultivation and decreased returns due to additional costs have been identified as the main reasons for the indebtedness of farmers in the State of Uttar Pradesh.
- Considering the options carefully, the Government of Uttar Pradesh under the "Farm Debt Waiver

Scheme" is committed to redeem crop loans up to one lakh of individual marginal and small farmers whose crop loans were disbursed by lending institutions in line with the RBI norms. With the following main objectives: 1) To examine socio-economic characteristics of the beneficiaries under the Farm Debt Waiver Scheme. 2) To study the nature and extent of indebtedness of the beneficiaries. 3) To put forth the perceptions of beneficiaries about the likely impact of the scheme on their livelihood.

- The present study was confined to the western region of Uttar Pradesh. Three distinct agro-climatic zones areas were selected randomly to cover and represent the whole western region of Uttar Pradesh. The agro-climatic zones and their districts were (1). Western Plain Zone (Bulandshahr), (2) Mid-Western Plain Zone (Moradabad), and (3) South-Western Semi-Arid Zone (Agra). Two blocks from each district and two clusters of villages were selected randomly for the field survey. A total of 15 beneficiaries of Farm Debt Waiver Scheme were randomly chosen from each of the clusters of village/villages. Thus, the total samples were comprised of 180 beneficiary farmers.

Findings

- On April 1st 2020, the total farmers in Uttar Pradesh were reported as 44,54,064 beneficiaries under Farm Debt Waiver Scheme and the total amount paid was estimated as Rs. 24,821.23 Cr. as a whole. The maximum sample farmers were illiterates (26%), and among literates, the maximum (24%) were matriculates only. The farmers having graduate and postgraduates' degrees were only about 6 percent.
- The annual household income had increased after the redemption of debt on all farms. The small farmers were benefited significantly in the area under study. The capital investments on machine, implements, irrigation structures and cattle sheds had increased after redemption of debt because of Farm Debt Waiver Scheme in the area under study. This shows the impact of the scheme on capital investments on marginal farms.
- In Rabi season, the operational cost of cultivation on marginal farms had increased by 31 percent after the redemption of debt which shows an impact of debt waiver scheme on marginal farms. On small farms too, there were considerable changes in the operational cost of cultivation during Kharif and rabi seasons due to the implementation of farm debt waiver scheme. A significant change was seen in the value of adult female buffaloes after redemption of debt. This change shows the impact of the scheme among marginal farmers rearing buffaloes.
- There was a clear impact of the scheme on credit structure of the marginal farmers as the change in amount borrowed was by 13.21 percent and in outstanding loan amount by 9.20 percent in case of loans from cooperative banks. The outstanding loan amount was decreased by 28.95 percent after the redemption of debt, showing the decrease in debt on marginal farms.
- On an overall basis out of 180 sample farmers, about 1.11 percent had told that getting benefits of scheme was time-consuming, 8.88 percent told it cost incurring, 24.44 percent had reported that many person-days were lost in getting benefits of the scheme.
- About perceptions on farm debt waiver scheme in Uttar Pradesh, out of 141 sample marginal farmers the maximum i.e. 37.59 percent had responded that there was not any reduction in agrarian stress, 14.18 percent told it less, 21.99 percent told it moderate, 26.24 percent told it low and no one told it huge.
- On all the sample farms the change in amount borrowed as well as in the amount outstanding was (-) 25.28 percent. 12.77 percent had faced humiliation and 32.77 percent viewed to face bribe etc. 36.67 percent had said no about the reduction in agrarian distress, 12.22 percent had told it less, 23.89 percent told it moderate, 27.22 percent told it low and no farmer had told it huge.
- About increased farm profitability, 12.78 percent had said no, 8.89 percent told it less, 38.33 percent told it moderate, 35.56 percent had told it low and 4.44 percent told it huge. In terms of decreased indebtedness, 5.56 percent had said no, 18.33 percent told it less, 52.22 percent had told it moderate, 17.78 percent told it low and only 6.11 percent had told it huge in the area under study.

Conclusion and Recommendations

- All marginal farmers should be benefited under the farm debt waiver scheme, and among small farmers, only the farmers having poor resources or not having adequate resources may be benefited.
- Both marginal and small farmers should be encouraged and assisted in shifting from their primary occupation of agriculture to other allied and secondary occupations for doubling their incomes. Also, rearing of crossbred cattle's, buffaloes and improved breeds of goats on their farms should be encouraged.
- Incentives to marginal and small farmers can be provided for diversifying their farms which

may increase the cropping intensity from 200 percent to at least 300 percent. The operational cost for cost of cultivation should be minimized by opting for the modern techniques of farming as per their available resources.

- To alleviate indebtedness, farm profitability of marginal and small farmers should be motivated to use modern and improved techniques of farming.
- The subsidies on farm machines particularly tractors, electric motors, rotavators, diesel engines and power threshers must be increased to benefit more genuine farmers.

- For profitable disposal of their produce marginal and small farmers must minimize their domestic expenditures. For better credit facilities, RRBs must be strengthened in the far off and remote villages to benefit poor farmers.
- Farm Debt Waiver Scheme can be implemented more transparently and with full accountability. The government can also waive off loans taken from private money lenders.

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Some Bottlenecks Behind Apple Orchardists of Himachal Pradesh Using Hail Protection Mechanism

Arvind Kalia, Nisha Devi Sadrate, Anil Kumar, Sujan Singh and Vamika Darhel

Introduction

- Horticulture, especially apple production plays an important role in the economic development of Himachal Pradesh. The varied topography of the state provides a great scope for apple production. The government has initiated various schemes for the development of apple farming by providing various facilities and incentives and consistent efforts are being made to strengthen the economy of apple orchardists. For the past few years, hailstorm has become a grave issue, and it has an adverse impact on the production of fruits. For the protection against hailstorm damages, hail protection mechanism like anti-hail Nets and Cannons are becoming very useful. Anti-hail Nets cover the plants like umbrellas. During the financial year 2018-19, 18.96 hectares was covered under anti-hail nets in district Shimla, the highest apple producing district in the state. On the other hand, anti-hail cannon shoots a fire shot in the air to disperse off the hail causing clouds. Area covered by each anti-hail cannon is approximately 80-90 hectares, i.e. within a radius of about 500 meters.
- For the first time in the country, in 2010-11 the

State Horticulture Department installed the anti-hail Cannons on pilot basis in the state under a central government-funded project worth Rs.3.29 crores, to protect apple crop from hailstorms during the flowering and fruit setting season. The state government imported these Cannons from California and installed these at Kathasu village of tehsil Jubbal, Braionghat village of tehsil Kotkhai and Deorighat village of tehsil Rohru. These Cannons were connected with the weather radar set up at the place of Tumdoo, located at an altitude of 10,000 feet near Kharapathar village of Tehsil Jubbal. The acetylene-firing anti-hail cannon covers an aerial distance of around 80 to 90 hectares, and the coverage area of the weather radar is 25 Kms. The Cannons send shock waves into the pressure areas where hail clouds are formed and punctures them, resulting in rain or soft hail instead of the damaging hailstones. Few orchardists in Shimla adopted this technology on their own without availing any government benefits. So far, five private anti-hail Cannons have been imported in 2016 from New Zealand and installed at Baghi, Ratnari, Kalbog and Mahasu villages of tehsil Kotkhai and Madaog village of tehsil Chopal.

Figure- 1: Images of Anti-hail Cannon and Anti-hail Nets



Source: Tribune <https://bit.ly/3lgoior>



Source: Amar Ujala <https://bit.ly/2QJFo5Y>

- The main objective of the study is to examine the impact of mechanism on apple crop and highlight some issues and challenges faced by hail protection mechanism users and non-users in district Shimla. Shimla district of the state was purposively selected because anti-hail Cannons were installed only in this district and also because it has the highest area coverage under anti-hail Nets. Two blocks Jubbal & Kotkhai and Thanedhar were selected based on highest numbers of Cannons installed and highest area covered under Nets. The study was based on a total sample of 120 orchardists, out of which, 90 users (45 each for anti-hail Cannon and Nets) and 30 non-users (15 each for anti-hail Cannon and Nets). The current policy brief is an updated version of previously published policy briefs (AEPB Issue 15, February 2020).

Findings

- Before the installation of hail protection mechanism in the study area, the hailstorm was a major event of loss for apple crop of sampled orchardists of district Shimla and this mostly happened during flowering and fruit setting seasons. In both, the blocks occurrence of hailstorms was more for non-users than users during the study reference period.
- The frequency of hailstorm was highest (>3 times)

for both users and non-users of anti-hail Net in Thanedhar block. The duration and intensity of hailstorm was higher for non-users of anti-hail Net. Non-users of both mechanisms in the district reported a higher expected loss of apple (in terms of affected area, quantitative and qualitative loss) due to hailstorms as compared to mechanism users. Thus, the hail protection mechanism had positive impact on its users of study area.

- Majority of users and non-users of both blocks (both mechanism) were not satisfied with the role of horticulture department in terms of visits undertaken, and mechanism advised post loss of apple crop due to hailstorm in their areas.
- Anti-hail Cannon and Net users attained better socio-economic profile and farm-level characteristics than non-users. They also attained better living standards as compared to non-users, this was due to increased production and orchards sale and income from orchard produce because of protecting their orchards with anti-hail Cannons and Nets.
- Hail protection mechanism has a two-way impact on apple produce. Firstly, it increases the quantity of apple production by protecting the crop from hail damage during flowering and fruit setting period and secondly, the mechanism improve the quality of the produce by substantially reducing

the hazards of marks and dents on the fully ripe fruit, hence, giving the mechanism users a better price for their produce. Whereas, for non-users, the quantity of apple is reduced by early damages to the crop and also marks and dents compromise the quality of produce in the fully ripe fruit. Thus giving the non-users comparatively lesser price for their apple produce in the market. Therefore, hail protection mechanism has a positive impact on the income and the production.

- Majority of users suffered high installation cost (67.78%), followed by lesser area coverage (47.78%), and mechanism not operated timely and no radar system (43.33% each). Majority of mechanism users recommended that maintenance/servicing (46.67%), followed by Net structure provision (44.44%), and subsidy area increased (40.00%). Radar installation, government takeover of Cannons, and more Cannons installation were the top three recommendations given by the majority of anti-hail Cannon users. Net structure provision, subsidy area increased, and maintenance/servicing were the top three recommendations given by the majority of anti-hail Net users.

Conclusions and Recommendations

- The two primary reasons given by non-users for not opting this mechanism were expensive and more labour effort (66.67% each) and the third reason was that government was not taking care of this mechanism in their areas (63.33%). 100 percent of the non-users were willing to use this mechanism, out of which, 63.33 per cent preferred Cannon and 36.67 per cent preferred Net. Majority of non-users suggested government control/takeover of the mechanism (80%), followed by more Cannons installation (43.33%), and finally, area under subsidy increased (40.00%).
- Orchardists face many troubles in installing and uninstalling these Nets every year in their orchards. Hence, the horticulture department can help provide suitable Net structures, and

organized well trained/professional labour force every year, to make the use of anti-hail Nets more efficient.

- More number of Cannons should be installed in the hailstorm prone areas. The placement of these Cannons should be of the peak of the hill for maximum impact. Anti-hail Nets can be used for a time span of 4-5 years after that these needs to be discarded. As these Nets are made of plastic, proper provision should be made to discard these Nets after they have served their utility.
- Hail protection mechanism users attained better social-economic profile and farm-level characteristics than non-users. Hence, the use of this mechanism (anti-hail Cannons and Nets) should be propagated in the apple-producing belt of the state.
- Non-users of hail protection mechanism reported a higher expected loss of apple crop due to hailstorm as compared the users, which proves that the mechanism was effective in preventing the losses from hailstorm, thus, use of this mechanism should be advertised and also incentivized.
- Horticulture department should organize information dissemination, and training and skill development camps, where better and more effective and efficient use of this mechanism can be taught to the orchardists for helping them protect their crop from hailstorms.
- Weather radars should be installed for every existing anti-hail Cannon and also for the future ones, so that Cannons can be operated effectively if and when the need will be.
- More per cent of mechanism users and non-users preferred Cannons over Nets as it saves them the annual effort of installing and un-installing Nets on trees. Thus, emphasis should be made on long term use of Cannons and its implications on the productivity of apple crop.
- Further scientific research can be carried out concerning the changes in climate or change in

the health of trees, fruits and soil due to installation of anti-hail Cannons and nets.

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