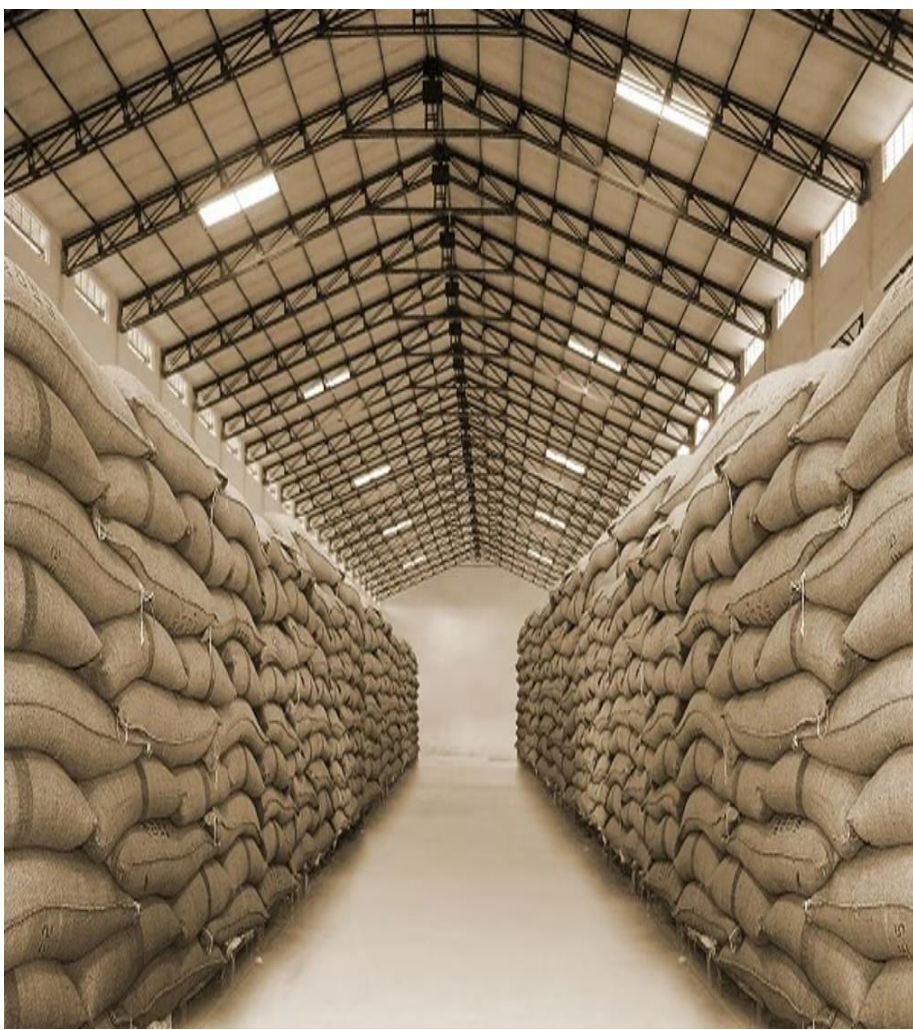


Change in Farmers Stocking and Marketing Decisions

Findings from Survey of Gram and Mustard Farmers in Madhya Pradesh and Rajasthan



SHWETA SAINI
PULKIT KHATRI
SIRAJ HUSSAIN



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Executive Summary

It is commonly believed that Indian farmers sell their entire produce almost immediately after harvest. Such assessment seems to be strong even within the Government of India. On the basis of such an assessment, successive governments assume immunity of Indian farmers to impacts of any knee-jerk trade restricting actions it takes during a crop's life cycle, under say the Essential Commodities Act 1955 (ECA) or Foreign Trade (Development & Regulation) Act, 1992. But both Indian farming and farmers are changing. The central and state governments, in the recent years, have been working towards augmenting farmer's agency over marketing of his produce. Various initiatives centred on increasing farmer's access to credit, credit-linked storages, affordable warehousing, credible market intelligence, expanding the Farmer Producer Organization (FPO) network, deepening digital markets, are among the many aggressively supported and promoted programs by various governments and its institutions. Thankfully, such interventions have begun to show results and farmers are showing greater agency over the marketing decisions of their produce. While anecdotally such evidences are growing, there was a need felt to undertake a scientific inquiry into the phenomenon which establishes this evolving behaviour.

We conducted a survey of 400 gram and mustard farmers in two major producing states of Madhya Pradesh and Rajasthan. The aim was to understand the farmers' crop marketing behaviour. A semi-structured questionnaire was used for this purpose. The questions centred around four themes: (i) socio-economic profile of the farmer; (ii) details about their landholdings, and their cropping patterns, (ii) assessing their marketable surpluses and marketing patterns, (iii) about their access and use of storages, and inter alia, (iv) the factors which influenced their decision about the sale of crops.

The two states of MP and RJ were selected as they are among the largest gram and mustard production hubs in the country. They together account for about 46 percent of India's gram production and about 57 percent of country's mustard production. The surveyed districts within the states were chosen based on the level of production of the two crops and the number of WDRA registered warehouses in the district. In total, 32 villages in MP and 82 in Rajasthan were covered under the study.

The survey respondents were selected based on random sampling. However, every respondent had to qualify on two criteria. First, they should be undertaking cultivation as a commercial activity, i.e., farmers who sold at least 50 percent of their produced crop. Farmers who undertook subsistence farming were not considered for

the survey. Two, only those farmers were studied who stored their crops at-least for 15 days after harvesting.

The survey was conducted between April and May 2023 and the questions were asked for the reference period February 2022 to January 2023 (marketing Year 2022-23).

About one-quarter of the surveyed farmers were small and marginal (SMF). Rajasthan farmer respondents operated on larger landholding sizes, on average, than the MP farmer respondents. The average age of the respondent farmers was about 42 years and the average family size was reported as 6.5 in both states. More than 90 percent of the sample reported to having bank accounts and above 90 percent of the farmers reported access to either institutional or non-institutional credit for agricultural purposes.

Key insights from the study include.

- ***Farmers are aware of market trends, and they act to maximise their returns:*** Farmers closely monitor market prices of their crops, more so when harvest time is nearing. They invest time and resources in assessing market sentiments and finding information about future prices. Based on their best judgement, they decide their offer for sale.
- ***Farmers undertake staggered sale:*** Contrary to the widespread sentiment that farmers sold their entire produce immediately after harvest, the study found evidence of staggered sale. Based on farmers' own perception of prices and behaviour of the fellow farmers, they decided the proportion of their surplus they were willing to offload at any particular time.
- ***Farmers stored crops for at least 3 months post-harvest but offloaded most of it before the next harvest:*** Farmers in Rajasthan took greater risks by storing both mustard and gram crops for longer periods compared to farmers in Madhya Pradesh. Farmers on average, stored gram for 102 days (more than three months post-harvest in March) in Madhya Pradesh and 114 days (close to 4 months post-harvest) in Rajasthan. Whereas mustard crop was also held for about 107 days in Madhya Pradesh and 110 days in Rajasthan.
- ***Finding storages was not an issue:*** Above 95 percent of the surveyed farmers reported storing their gram and mustard crops in self-owned storages. Institutional storages were mostly used by large farmers.

- *Problems with big storage houses and warehouses:* Lack of large marketable surpluses and inflexibility in accessing their produce in big warehouses were impediments for farmers in accessing institutional and large private storages.
- *SMF acted similar to medium or large farmers:* A significant finding of our survey is that there was no significant difference in the staggered sale pattern between small and marginal farmers (SMF) and non-SMF farmers. Only a slight variation was reported in Rajasthan where SMF sold a slightly higher proportion during the peak harvest months.
- *Sudden and ad-hoc trade restrictions by government reduced value-realization by the farmers:* Trade restricting government policies, particularly ones under EC Act and Foreign Trade (Development & Regulation) Act, 1992, adversely impacted the prices farmers received on their stored crops, pulling down their incomes.
- *Most had access to short term credit:* Access to credit improves a farmer's ability to take risk and thus delay his crop's sale while timing the market. About 90 percent of the surveyed sample farmers reported access to either institutional or non-institutional credit.
- *Dearth of reliable market intelligence:* At least 40 percent of all farmers in both states identified the need for relevant, credible, timely and free market intelligence which can help them plan their marketing (thus storage patterns) better suggesting that price discovery instruments such as future contract prices might help in better sense of price behaviour in coming months.

Overall, it emerged from the study that farmers today undertake conscious decisions for their crop sale. Policy instability and unpredictability, dearth of affordable institutional storages and timely access to credible market intelligence are some low-hanging opportunities, if corrected can further empower Indian farmer.

Some of the policy recommendations include: (i) bringing stability and predictability in **policy decisions**. It takes years for various stakeholders to create storages, trading relations, among others and with ad-hoc and knee-jerk policy actions much of these trades suffer, where the ultimate incidence of the shock is suffered by the farmers; (ii) **trio of Warehousing, NWRs and Credit** - a robust post-production strategy should involve a comprehensive approach that ensures efficient warehousing, recognizes the true and correct value of the collateral, issues negotiable warehouse receipts, and provides accessible post-harvest loans with interest subvention. This integrated strategy can contribute to the overall development and sustainability of the

agricultural sector. Additionally, it is essential to promote awareness among farmers regarding post-harvest loans secured against Non-Warehouse Receipts (NWRs), and financial institutions should be encouraged to engage in the pledge loan system. The government should consider reassessing the guidelines and eligibility criteria for post-harvest subsidized loans, ensuring accessibility, particularly for small and marginal farmers or tenant farmers, who have not obtained a crop loan and therefore have no credit history or a CIBIL score.

In the expanding digital footprint, GOI should invest in deepening physical, electronic and derivative markets of at least key agricultural commodities. It is only with stable, robust and thriving Agri-markets that the Indian farmers can be truly empowered.

Introduction

More than 86 percent of Indian agricultural households are small and marginal (SMF), i.e., their landholding size is below 2 hectares (Agricultural Census 2015-16). Smaller landholding sizes produce smaller size of crops, and after accounting for the crop retained by the farmer for self-consumption/seed/feed use, even smaller quantities of marketable surpluses. A smaller crop size lowers farmer's agency over his crop marketing decisions thus making him a price taker. With no credible mechanism to assess or predict future prices¹, the liquidity-tight farmers have no option but to sell the crop soon upon its harvest. Usually, the mandi prices are at its lowest during a crop's harvest (OECD 2018), therefore farmers are unable to realize full economic potential of their crops. To alleviate the situation and empower average Indian farmers, Government of India (GOI) continues to run several programs and schemes. One of the programs is the push for Farmer Producer Organizations (FPOs), where farmers are encouraged to form a group or a company and participate along their crops' supply-chains. Simultaneously, to provide farmers with greater agency and autonomy over marketing decisions of their crops, GOI, encouraged, among other things, a *two-pronged strategy*: (i) it encouraged the negotiable warehouse system (NWR) whereby it provided access to credit for farmers against value of their stored crops; and (ii) it undertook efforts to create storages and warehouses closer to the farm-gate (PIB 2022). With easier access to credit, farmers could continue the sowing activities of their next crop, while tracking the prices to make a conscious and an informed decision about sale of their crops (Sher, Mazhar & Qiu 2023). In this endeavour, scientific and affordable storages closer to the farm-gate would ensure their crops are stored in good conditions. Schemes such as *Gramin Bhandarn Yojana* (2001), National Rural Employment Generation Act (2005), *Rashtriya Krishi Vikas Yojana* (2007) have augmented storage facilities with the farmers. There are reports of farmers storing a part of their produce which includes even perishables like as onion, potatoes (Kulkarni 2022, Das. S 2022, Moneycontrol 2023, Das. P 2023).

There is growing evidence that when governments undertake trade restricting actions even a few months after-harvest, the Indian farmer, together with traders and other stakeholders, suffer losses (Arya 2015, Saini 2022, Goel and Krishnan 2022, Biswas 2023). It is ironical that on one hand, GOI is investing heavily in encouraging farmers to store and sell their crops by choice rather than under duress, and on the other, almost simultaneously, undertakes trade restrictive actions conveniently assuming that farmers do not store and would not be impacted by the said policies.

¹ Government Bans Future Trading in 7 Commodities to Curb Inflation. [Link](#).

Barring a few studies, academic literature still often claims that farmers are unable to store their crops for sale at later dates (Balraj 2016, Pandey 2018, Naik *et al* 2022). With anecdotal evidence for farmers increasingly storing their produce to realise better prices later in the season, this study undertakes a scientific inquiry into this phenomenon. It studies storing and marketing decisions of farmers across a crop's marketing year and checks whether farmers are storing to stagger sale their produce to smoothen consumption and/or to maximise returns. For achieving this objective, a primary dataset of 402 gram and mustard farmers in two major producing states Madhya Pradesh and Rajasthan was created. The sampled farmers were identified based on geographical proximity to institutional storages and markets reporting high volume of trading for the two crops. Additionally, to track and understand the storage and marketing behaviour, only those farmers were studied who held back their harvest a minimum of 15 days after harvesting activities on the farm were completed.

The research is presented in 6 sections. In Section 1 existing literature related to farmer marketing patterns is discussed. In Section 2 and 3, a background is presented on the two studied crops and states. In Section 4, the approach and methodology for the survey is discussed. In Section 5, characteristics of the surveyed farmers is discussed followed by the results from the survey in Section 6. Finally, conclusions and policy implications are discussed.

Section 1: Crop Storage and Marketing Decisions of Indian Farmers

In a typical year, the crop prices are lowest immediately upon harvest and are usually the highest before the next crop is to arrive as the stocks from previous crop are at its lowest (*upcoming Saini et al 2024*). This reflects the inverted value realization curve for the farmer as most sales are undertaken by farmers during harvest, when prices are at the lowest and as prices rise during the year, farmers are usually thin on stocks. But if the farmers know about this pattern, why would they sell their crops in distress and not defer their sale decisions to make better incomes?

Priya and Mitra in 2020 conducted a survey of 448 smallholder farmers in seven Indian states to model their marketing and storage behavior. They found that attitude of farmers and social norms significantly impacted a farmer's decision about storing and deferring their crop's sale. However, lack of knowledge about future price movements in a commodity increased the risk associated with storage, forcing many to sell their crops as soon as possible.

Access to credit is critical for an average Indian farmer. Sahu *et al* 2019 studied paddy farmers in Odisha and found that lack of access to affordable and timely credit pushed farmers to undertake distress sale of their crops. An average Indian farmer is usually debt-strapped as instability in both production and income cycles make it inevitable for him to not be constantly indebted (Saini, Khatri, and Hussain 2021). As a result, distress sale of a crop at harvest is not uncommon as the farmer would need money to sow the next crop and pay off his previous loan. Gupta *et al* 2017 and Bhoi *et al* 2019 found that factors like unviability of agriculture, adverse trading conditions, high rural debt, inefficient value-chains, and inadequate government procurement systems force farmers to undertake distress sale of their crops.

Literature suggests that the problem of deferring the decision to sell is more intense for India's SMF. Manhandar *et al* 2018 found that SMFs in the developing countries did not store produce mainly due to lack of access to affordable and quality storages near farms. Analyzing primary data in Morena district of Madhya Pradesh in case of mustard and rapeseed, Sharma *et al* 2017 found that with larger landholding sizes grew a farmer's risk-taking capacity making him more likely to defer his sale decisions.

The decision to defer crop sale was also found to be a function of the crop's perishability. Singh *et.al* 2021 studied rice and wheat farmers of Punjab and found that while most farmers were willing to stagger sale wheat, they were unwilling to do that in case of rice. The high moisture content in paddy made it a less preferred crop for storage.

Overall, most of existing research literature portends the issue of stress selling and its causal factors. Impact of governmental storage-related programs, and private initiatives relating to access to information such as prices, storages, and credit, increased financial and digital inclusion, among others seem missing in the research narrative around the topic.

In the following sections, we discuss the two studied crops (gram and mustard) and look at available secondary data to understand, in general, the crop disposal patterns in the markets.

Section 2: Why study gram and mustard and why in Madhya Pradesh and Rajasthan?

Rajasthan and Madhya Pradesh are important states for agricultural production. In the last three financial years (2020-21, 2021-22, 2022-23), of the total Gross Value Added, agriculture and allied activities (A&A) contributed to 45 and 30 percent respectively in Madhya Pradesh and Rajasthan (MOSPI). In 2019-20, these two states accounted for 26 percent (13 percent each) of the total cropped area in India (DES). As per data for Agriculture Census 2015-16, these two states accounted for 12 percent of total operation land holdings in the country (Madhya Pradesh: 6.8 percent and Rajasthan 5.2 percent) (Table 1).

In terms of area under operation holdings, Madhya Pradesh accounted for 9.9 percent and Rajasthan's share was 13.2 percent. Also, these two states are predominantly home to SMFs. Of the total operation holdings in Madhya Pradesh and Rajasthan, 76 and 62 percent were SMF land holdings. In terms in share in total area, SMF land holding only accounted for 40 percent and 19 percent in Madhya Pradesh and Rajasthan respectively. The average landholding size was 1.57 hectares in Madhya Pradesh and 2.73 in Rajasthan, higher than all-India average landholding size of 1.08 hectares.

Also, with Agro-climatic variability, a variety of crops are cultivated in the two states. With respect to gram and mustard, in TE 2021-22, Rajasthan ranked third and first in gram and mustard production respectively. Madhya Pradesh ranked first and second in gram and mustard production respectively (DES).

With recent focus on increasing collective bargaining of the farmers, Farmer Producer Organizations have been set up aggressively in the country. With 550 FPOs in Madhya Pradesh and 351 FPO in Rajasthan, the two states account for about 13 percent of all FPOs in the country (PIB 2022).

The two states also have a better institutional (registered) storage mechanism than other Indian states. A registered warehouse means "*a warehouse in respect of which a certificate of registration has been issued to the warehouseman by the Authority for carrying out the warehousing business*" (WDRA 2017). While registered warehouses aim to provide affordable and quality-controlled storage spaces to different market participants including farmers, one major function is the mechanism of issuance of

credit to farmers in lieu the produce kept by them in the registered storages. When a farmer stores a crop in the registered warehouse, a warehouse receipt is issued. This receipt called the Negotiable Warehouse Receipt (NWR) is a transferable instrument and can be used for payment, credit and as security (WDRA). As per data from WDRA, India has about 4633 WDRA registered warehouses. Madhya Pradesh and Rajasthan reported 1247 and 377 registered warehouses. These two states constitute to a hefty 35 percent of total WDRA registered storages in the country.

Table 1: Background on Madhya Pradesh and Rajasthan

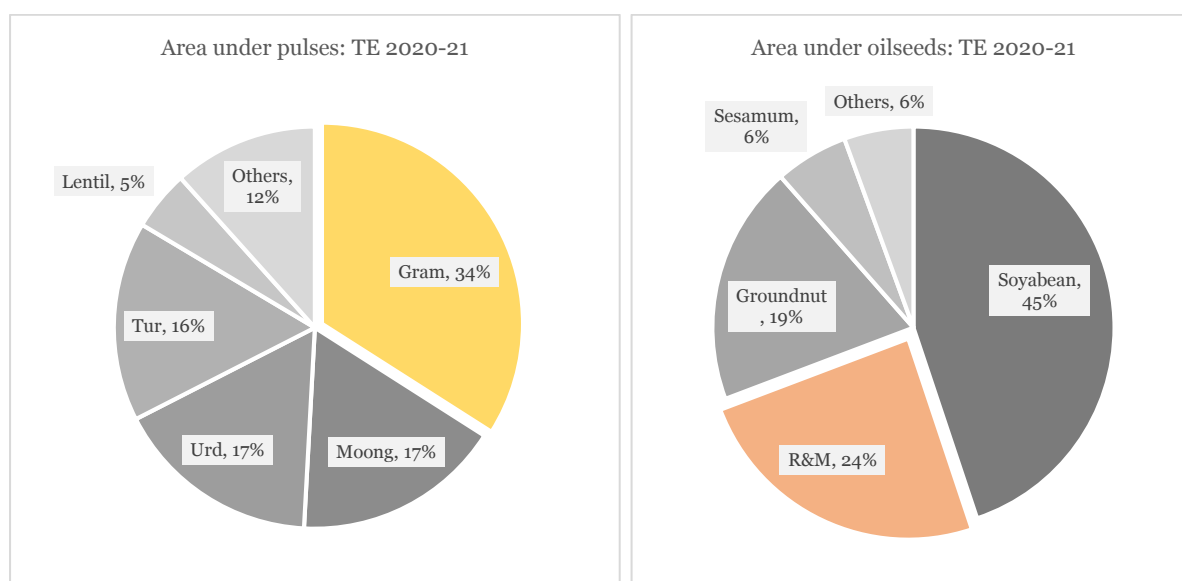
Item	Madhya Pradesh	Rajasthan
Share in total cropped area in India	45.0%	30.0%
Share in total land holdings in India	6.8%	5.2%
Percent SMF land holdings in the state	76.0%	62.0%
Rank in Gram production (TE 2021-22)	First	Third
Rank in Mustard production (TE 2021-22)	First	Second
No. of FPOs	550 (7.8%)	351 (5%)
No. of WDRA storages	1247 (27%)	377 (8%)

Source: DES, MOSPI, Agriculture Census 2015-16, PIB, WDRA | Note: Number in parenthesis is the share in All-India.

Due to the significance of the two states in Indian agriculture, high share of production for both gram and mustard, and institutional mechanisms for supporting agriculture marketing, the two states were selected for the survey.

For this study, gram (pulses) and mustard (oilseed) were selected. These crops are relatively non-perishable and can be stored for longer duration. Both of them are significant to Indian pulses and oilseed basket. About 1/3rd or 34 percent of India's area under pulses is under gram (triennium ending 2020-21, taken from DES, GOI). Mustard, has the highest oil content among the major oilseeds in the country, and is the second most cultivated oilseed crop after soybean with a share of 24 percent share in India's area under oilseeds (Figure 1).

Figure 1: Area under cultivation for pulses and oilseeds



Source: Department of Economics & Statistics (GOI) | Note: R&M stands for Rapeseed & Mustard.

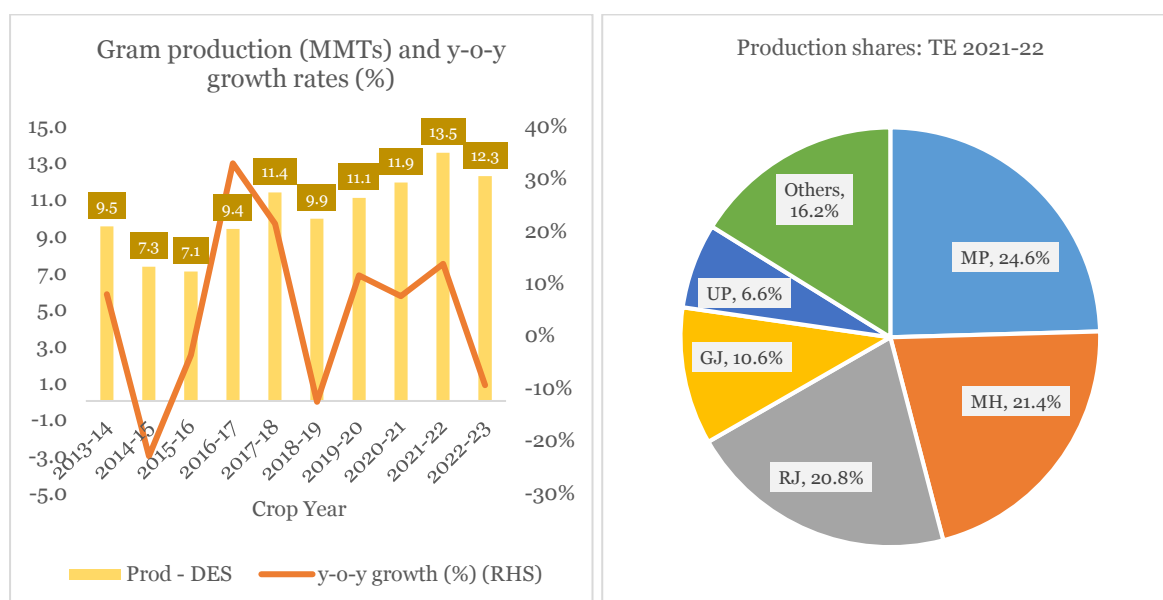
In terms of production, for TE 2020-21, gram accounted for 47 percent of total production of pulses in the country and mustard accounted for 28 percent of production of oilseeds.

As a share of the Value of Output (VOO) from total pulses in the country of about Rs. 71,825 crores, contribution from gram was 44 percent at Rs. 31,372 crores. Whereas, as a share of the VOO generated from total oilseeds in the country of about Rs. 1.16 lakh crores, contribution from mustard was 26 percent at Rs. 30,556 crores.

Section 3: Background on Indian Gram and Mustard Crops

Over the years, production of both gram and mustard has been rising. As per DES (GOI), gram production in the country was 12.26 million metric tonnes (MMTs) in 2022-23. Between 2012-13 and 2022-23, production grew at 4 percent per annum². The production in the last two years is estimated to be the highest in the last 10 years. In the triennium ending (TE) 2021-22, about 84 percent of gram production was concentrated in five states. The two surveyed states, Madhya Pradesh, and Rajasthan together account for about 45.3 percent of total production (Figure 2).

Figure 2: Gram production in India and share of states

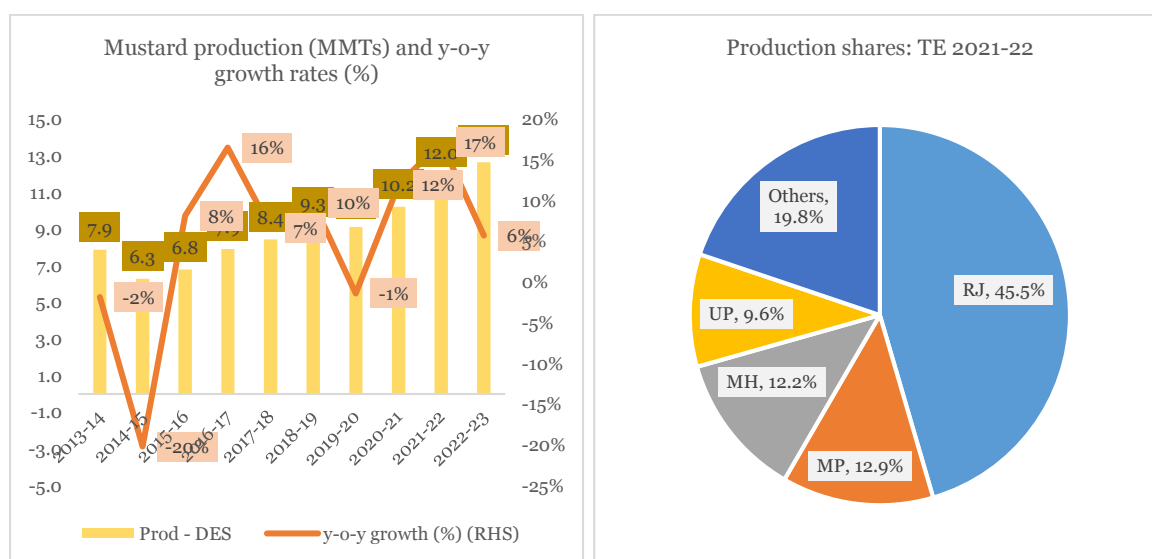


Source: Department of Economics & Statistics (GOI)

Indian mustard production too has been rising in the recent years. From about 7.9 MMTs in 2013-14, mustard production is estimated to have grown to 12.5 MMTs in 2022-23. This implies an annual average growth rate of about 4.5 percent. In the triennium ending (TE) 2021-22, about 80 percent of mustard production was concentrated in four states. Rajasthan accounted for the highest share of 45.5 percent, followed by MP (12.9 percent), MH (12.2 percent), and UP (9.6 percent) (Figure 3).

² Compound Average Growth Rate (CAGR)

Figure 3: Mustard production in India and share of states



Source: Department of Economics & Statistics (GOI)

India is largely self-sufficient in gram and mustard. As per data from DGCIS, gram is both exported and imported, but overall, the country is a net exporter in gram. In financial year (FY) 2022-23 about 3.5 lakh metric tonnes was exported. Even though mustard oil is not traded much, its meal is.

Marketed Surplus Ratio (MSR) is the proportion of the total produce that the farmer agrees to offer for sale in the market. The farmer usually holds back a proportion of his produce to meet his own household's consumption needs, and for meeting needs for seed and feed. Latest data on MSR is available for the year 2014-15 from GOI's Agriculture Statistics at a Glance. MSR for gram and mustard at an all-India level was 91.1 percent and 90.9 percent respectively (DES 2020). This implies that on average a gram or a mustard farmer in India retains about 8 to 9 percent of the produce for meeting their needs and offer to sell the remaining 91 to 92 percent in the market. In MP and RJ, gram MSR were 93.3 and 94.14 percent respectively. In mustard, the MSR were 97.3 percent and 94.02 percent respectively in MP and RJ respectively.

To support prices received by the farmers, on behalf of GOI, the National Agriculture Cooperative Marketing Federation of India (NAFED) undertakes buying of both gram and mustard. In the period of the study, NAFED did not procure mustard but bought about 2.5 MMTs of gram (about 19 percent of total gram production in the year).

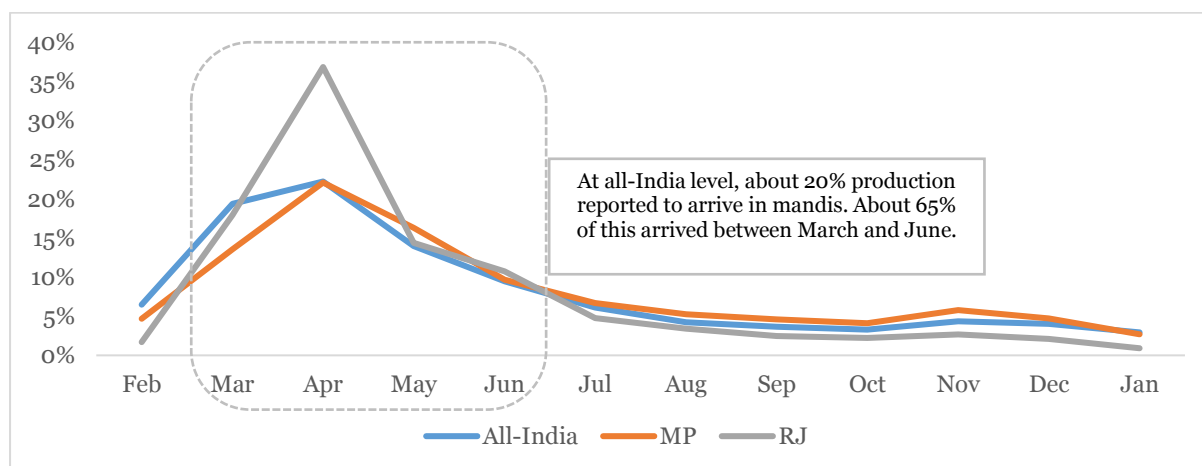
Most of both gram and mustard crops are traded outside the institutional mandis in the two states. As per data on mandi arrivals (Agmarknet), only 20 percent of the total gram production in the studied year arrived in mandis. In case of mustard, this ratio was about 36 percent.

Mandi arrivals in the two crops, like in many other, have a typical pattern (Figure 4 and Figure 5). We explain the arrival and price trends using the current survey's reference period February 2022 to January 2023 (marketing Year 2022-23).

Mandi Arrivals

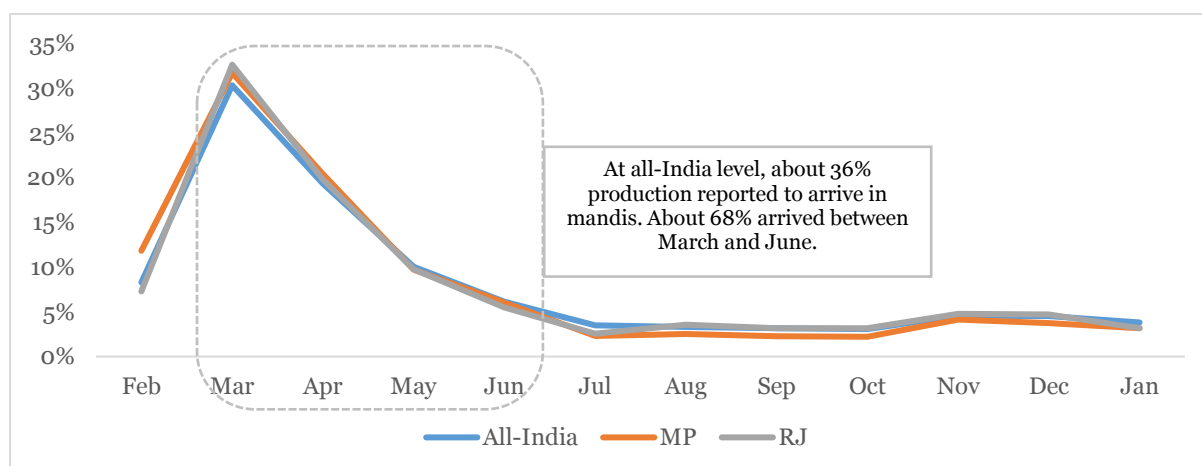
For gram in marketing year (MY- Feb to Jan) 2022-23, arrivals began in February and peaked in April. Between March to June, about 65 percent of annual gram had arrived in the mandis. More than 1/3rd (35 percent) of annual crop arrivals followed post June. Pattern is similar in the case of mustard too. Interestingly, as per the figure 4 and 5, arrivals post May, are higher in gram in MP (tail is thicker than in RJ) and in mustard in RJ (thicker tail than in MP). Most certainly, farmers are undertaking staggered format of selling their crops.

Figure 4: Gram arrival pattern for MY 2022-23 in India, MP, and RJ



Source: Agmarknet

Figure 5: Mustard arrival pattern for MY 2022-23 in India, MP and RJ

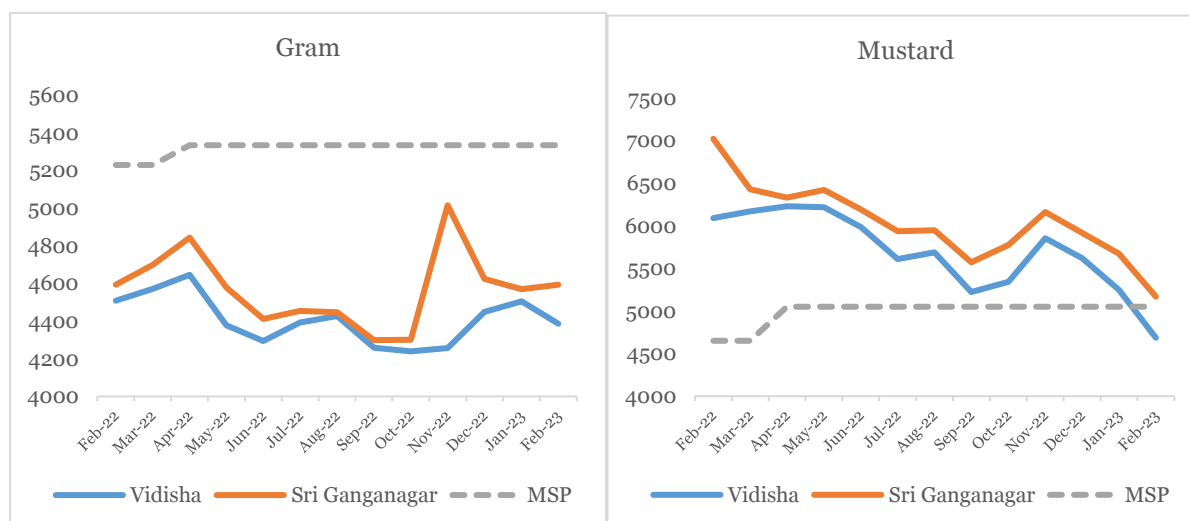


Source: Agmarknet

Mandi Prices

During the survey reference period, gram mandi prices were trading below the minimum support prices (MSP) in both MP (Vidisha district) and RJ (Sri Ganganagar district) (Figure 6). Even though the prices began to rise around Oct-Nov 2022, they continued to trail MSP in the year in both states.

Figure 6: Mandi Prices for gram and mustard in MY 2022-23 (Rs./Qtl)



Source: Agmarknet

In case of mustard (RHS Figure 6), mandi prices in both states were lucrative in the year, touching Rs. 7000/quintal in some mandis during harvest months. The MSP for the year was Rs.5050/quintal.

Countercyclical Price Trends in Mustard and Gram during 2022-23 and the Survey

As mentioned before, prices of crops usually follow a predictable trajectory: they are lowest when crops are harvested and arrive in mandis in bulk, after which then they begin to rise reaching the peaks right before the harvest when the stocks of the crops are at their lowest. As per trends in Figure 6, the mandi prices of both gram and mustard were high in the harvest months (February-March), but began to fall thereafter. This implies that any farmer who would have held back these crops from selling immediately postharvest, in anticipation of making more money, would have actually gained lower (or even lost) than what he would have had he sold immediately upon harvest.

But why did prices fall post-harvest? String of policy actions to curtail rising price pressures explains some of this price trend.

In case of gram, domestic prices of pulses were rising and in response to market dynamics, GOI undertook several steps, including invoking of provisions under the Essential Commodities Act (ECA 1955) in July 2021, granting open imports in May 2021, and formalising memorandum of understanding (MOUs) with Mozambique, Malawi, and Myanmar for pulse imports in March and June 2021. While decisions primarily focused on tur, masur, and urad, the National Agricultural Cooperative Marketing Federation (NAFED) was directed to release chana stocks to diffuse rising pressures on prices. On August 16, 2021, the Securities and Exchange Board of India (SEBI) mandated the National Commodity & Derivatives Exchange Limited (NCDEX) to cease future trading in chana, alongside six other commodities. Despite the government's procurement of around 2.6 million metric tons of chana in March-May 2022, chana prices trailed the Minimum Support Price (MSP).

In case of mustard, the prices fell owing to cheaper open imports, mainly of palm and sunflower, and the subsequent supply response from Indian mustard farmers who expanded bumper acreages under the crop (Shagun 2023).

These events during the survey year helped us, *inter alia*, in two ways: (i) we could document the adverse impact of knee-jerk policy actions on farmers; and (ii) financial and psychological impact on account of continued policy uncertainty and absence of commodity markets could be verified. We present the findings in subsequent sections.

It was, however, intriguing to note that despite prices being lower than MSP, the farmers continued to favour acreages under these two crops. An answer to that can be found in the intrinsic farmer economics. We explain below.

Profitability of Gram and Mustard farmers

To produce a quintal of gram, it costs about Rs. 1936 to an MP farmer and about Rs.1700 to a RJ farmer. Mustard costs are relatively cheaper. A quintal of mustard would cost about Rs. 1520 in MP and Rs.1643 in RJ (Table 2). After accounting for the imputed costs for family labour, capital and land, these costs (C2) become Rs.3644/quintal (MP) and Rs.3637/quintal (RJ) in case of gram and Rs. 3223 and Rs. 3777 per quintal respectively in case of mustard. The MSPs for the two crops in FY 2022-23 were Rs. 5230 in gram and Rs. 5050 in mustard. This translates to profitability of anywhere between 94 to 167 percent in both crops. Interestingly, at mandi prices (weighted average using arrivals as weights) too, the profitability ranged between 73 to 212 percent. These two crops are cheaper to produce, require lesser water and relative to many other crops, have a longer shelf life.

Table 2: Comparing Costs and Returns in Gram and Mustard for MP and RJ (Rs./Quintal)

MY 2022-23 (February to January)	MP		RJ	
	Gram	Mustard	Gram	Mustard
A2	1936	1521	1702	1643
A2+FL	2454	1894	2693	2507
C2	3644	3223	3637	3777
Weighted average mandi price	4586	5918	4654	6475
MSP	5230	5050	5230	5050
Return over Av. mandi price	87%	212%	73%	158%
Return over MSP	113%	167%	94%	101%

Source: DES and CACP | Note: For estimating weighted average price, in MP and RJ, state's average monthly arrival pattern is considered as weights. Price data is taken for Vidisha and Sri Ganganagar districts in MP and RJ respectively.

Section 4: Design and Geography of the Primary Survey

To understand the farmers' crop marketing behaviour a semi-structured questionnaire with five sections was created. The questions centred around four themes: (i) socio-economic profile of the farmer; (ii) details about their landholdings, and their cropping patterns, (iii) assessing their marketable surpluses and marketing patterns, (iii) about their access and use of storages, and *inter alia*, (iv) the factors which influenced their decision about the sale of crops.

As the idea of the survey was to profile and understand farmers who stored crops, profile their challenges and decision-making processes, two qualifying criteria for identifying the survey respondents were put in place. First, only those farmers were studied who undertook crop cultivation as a commercial activity, i.e., farmers who sold at least 50 percent of their crop's produce. In other words, farmers who undertook subsistence farming were not considered for the survey. Two, only those farmers were studied who actually stored their crops (at least for 15 days post-harvest). As the intent was to understand behaviour of these farmers towards their crop storages, it was felt necessary to study and profile opportunities and challenges faced by such farmers.

The surveyed districts were chosen based on the production of the two crops and the number of WDRA registered warehouses in the district. Based on these parameters, Vidisha district in Madhya Pradesh and Sri Ganganagar district in Rajasthan, were chosen. A snowball sampling method was followed by the survey teams to locate farmers that fall under the two recruitment criteria mentioned above. To fulfil the sample requirement for mustard farmers in Rajasthan, additionally Jaipur and Rai Singh Nagar were also studied. The details of districts studied are mentioned in the Table 3.

Table 3: Districts covered under the study

Districts studied in Madhya Pradesh			
S. No.	District	Crops	Villages Covered
1	Vidisha	Gram	10
2	Vidisha	Mustard	22
			32
Districts studied in Rajasthan			
S. No	District	Crops	Villages covered
1	Sri Ganganagar	Gram	21
2	Jaipur	Mustard	1
3	Rai Singh Nagar	Mustard	2
4	Sri Ganganagar	Mustard	58
	Total		82

To test the questionnaire, pilot survey of farmers was conducted in Vidisha district of Madhya Pradesh and Rai Singh Nagar district of Rajasthan. A total of 16 pilot interviews were conducted and the learnings were incorporated in the research questionnaire. In addition, survey teams were trained, and questionnaire was translated in the local language (Hindi). The actual survey was conducted between March and April 2023. Under the survey 422 responses were collected across the two states. After quality checks, a total of 402 responses were shortlisted for analysis. Details of the studied sample are presented in Table 4.

Table 4: Details of sample covered

Crop	Madhya Pradesh	Rajasthan	Total
Gram	109	91	200
Mustard	97	105	202
Total	206	196	402

Section 5: Profile of the Surveyed Farmers

A mix of farmers were studied under the survey. Agriculture Census defines farmers based on their landholding sizes. A marginal farmer operates on less than or equal to 2.5 acres of land, small farmers operate on less than or equal to 5 acres but greater than 2.5 acres of land, medium farmers operate on less than/equal to 10 acres but greater than 5 acres land and large farmers operate on greater than 10 acres of land.

In case of gram, of the total sample, 22 percent were small and marginal farmers (SMF), 27 percent were medium-size farmers and 52 percent were large farmers. In case of mustard, 29 percent SMF were studied, followed by 37 percent medium and 34 percent large farmers (Table 5). These categorizations are based on the total operated area reported by the farmers. Total operated area is the sum of owned land, leased-in land net of leased-out and fallow land.

Table 5: Landholding size wise profile of Survey Respondents

Farmer type	Gram			Mustard		
	MP	RJ	Total	MP	RJ	Total
Marginal	5%	1%	3%	10%	4%	7%
Small	21%	15%	19%	25%	20%	22%
SMF	26%	16%	22%	35%	24%	29%
Medium	34%	19%	27%	35%	38%	37%
Large	40%	65%	52%	30%	38%	34%
Total respondents (no.)	109	91	200	97	105	202

Source: Arcus Policy Research | Note: Farmer type is based on total operated land with the farmers.

Basic characteristics of the sample are presented in Table 6 below. The average age of the respondent farmers was between 38 and 44 years and the average family size of the respondents was above 6.5 in both the states. Greater than 90 percent of the sample reported to having bank accounts and above 90 percent of the farmers reported access to either institutional or non-institutional credit for agricultural purposes. In addition, about 3/4th of the sample had crop insurance, and the FPO membership was found to be low in both states (MP at 13 percent and RJ at 6 percent). In the studied areas, dominant crops³ were: (i) Soybean-Paddy-Urad in the kharif season followed by

³ Crops are arranged in descending order of the count of responses by surveyed farmers.

Wheat- Gram-Mustard in the *rabi* season in MP; and (ii) Cotton-Moong-Jowar in the *kharif* season and Mustard-Wheat-Gram in the *rabi* season in RJ.

Table 6: Key characteristics of sample respondents

Item	Madhya Pradesh		Rajasthan		Overall	
	Gram	Mustard	Gram	Mustard	Gram	Mustard
No. of respondents	109	97	91	105	200	202
Average age (years)	41	38	48	44	44	41
Average family size	6.6	6.8	6.9	6.4	6.7	6.6
Irrigation coverage (% of total operated area)	90%	83%	92%	93%	91%	88%
Bank accounts (% respondents)	97%	100%	95%	93%	96%	97%
Access to credit (% respondents)	94%	99%	94%	84%	87%	91%
Associated with FPO (% respondents)	19%	4%	6%	8%	13%	6%
Access to crop insurance	74%	66%	77%	68%	76%	67%
Average distance to bank (km)	9	13	12	11	10	12
Awareness of future trading (% respondents)	24%	7%	43%	42%	33%	25%
Dominant crops	Kharif (Soybean, Paddy, Urd) & Rabi (Wheat, mustard, gram)		Kharif (Cotton, Moong, Jowar) & Rabi (Wheat, gram, mustard)		-	

Source: Arcus Policy Research | Note: Access to credit is considered "Yes" for a farmer if he has accessed any loan for agricultural purposes, either from institutional or non-institutional sources.

In terms of land ownership, 100 percent of the total sample owned land. Of the total sample, 19 and 22 percent of the sample in Madhya Pradesh and Rajasthan respectively also reported having leased-in land for cultivation (Table 7).

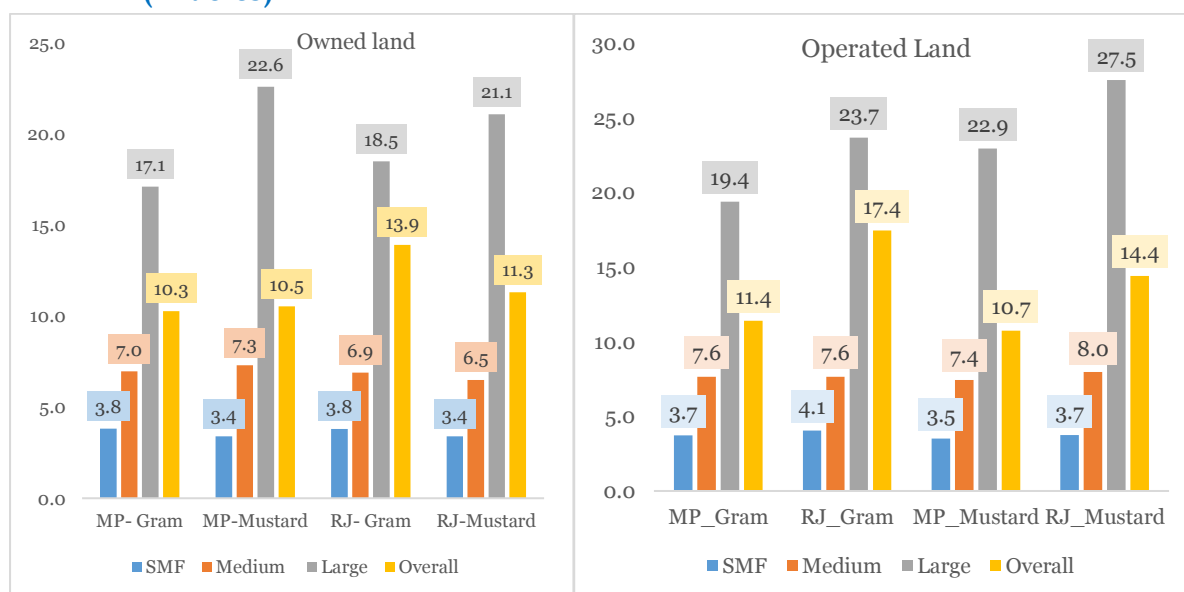
Table 7: Details on land holdings of respondents: Owned and Leased-in

Item	Madhya Pradesh		Rajasthan		Overall	
	Gram	Mustard	Gram	Mustard	Gram	Mustard
Proportion of respondents with owned land	100%	100%	100%	100%	100%	100%
Proportion of respondents with leased-in land	13%	7%	26%	36%	19%	22%
Average size of owned land (Acres)	10.3	10.5	13.9	11.3	11.9	10.9
Average size of leased-in land (Acres)	1.3	0.4	3.6	3.1	2.3	1.8

Source: Arcus Policy Research

The average owned land sizes for gram and mustard are presented below (Figure 7). The average owned land size was the highest for gram farmers in Rajasthan (13.9 acres), followed by mustard farmers in Rajasthan (11.3 acres), mustard farmers in Madhya Pradesh (10.5 acres) and gram farmers in Madhya Pradesh (10.3 acres).

Figure 7: Average owned (LHS) and operated (RHS) land with surveyed farmers (in acres)



Source: Arcus Policy Research | Note: Farmer type is based on total owned/operated land with the farmers. 'Overall' is the weighted average of the average land size where share of different farmer types in total sample are considered are weights. In MP, some farmers reported leasing-out of land. Therefore, the operated land is lower in some cases.

In terms of total operated area with the farmers, Rajasthan farmers reported higher average operated area compared to farmers in Madhya Pradesh (RHS Figure 7). As per the survey data, the average operated land with gram and mustard farmers in Madhya Pradesh was 11.4 and 10.7 acres respectively. Whereas, for gram and mustard farmers in Rajasthan the average size of operational holding was reported to be 17.4

and 14.4 acres respectively. Total operated land increased as the land holding type of farmers changes across states, with SMF farmers reporting the lowest total operated land. Across the two states, operated land size was similar for SMF and medium farmers. Whereas, large farmers in Rajasthan (23.7 to 27.5 acres) reported higher operated land in compared to Madhya Pradesh (19.4 to 22.9 acres).

Section 6: Findings from the Survey

This section details the learnings from the survey including findings regarding the marketable surplus generated by the farmers, the pattern of crop marketing across the marketing year, storage patterns are discussed. This part of the report also discusses the qualitative responses from the surveyed farmers regarding their crop marketing and storage behaviour. The findings are discussed below.

1. Assessment of Farmer's marketable surpluses

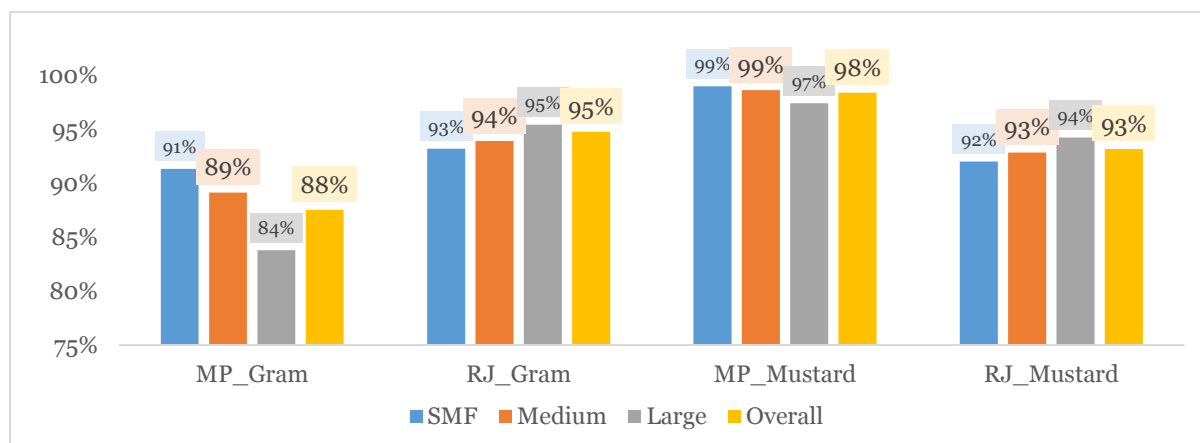
Every respondent was asked about their crop size and the proportion of marketable surpluses were estimated after accounting for seed, feed, other uses. Farmer responses suggest that as percent of production, in case of gram, Rajasthan farmers reported higher marketable surpluses of 95 percent compared to farmers in Madhya Pradesh (about 88%). Whereas for mustard, higher marketable surpluses were reported by farmers in Madhya Pradesh (98%) compared to Rajasthan farmers (93%)⁴ (Figure 8).

In gram, average marketable surplus across farmer categories was 20 and 61 quintals in Madhya Pradesh and Rajasthan respectively. In Madhya Pradesh, there was no difference between marketable surpluses generated by SMF and medium sized farmers. In Rajasthan, gram marketable surpluses increased with increase in landholding sizes with large farmers reporting more than double (80 quintals) the marketable surpluses generated by medium sized farmers (30 quintals). In case of mustard, in Madhya Pradesh, SMFs reported marketable surpluses of 11 quintals which was greater than medium farmers with reported marketable surplus of 9 quintals.

Madhya Pradesh was observed to be an intriguing case. In the state, medium and large gram farmers reported higher closing stocks of gram that ended up reducing their marketable surpluses in the reference year. This was also true for large mustard farmers in Madhya Pradesh. This suggests a prolonged storage behaviour.

⁴ As reported in the earlier section using data from Agricultural Statistics at a Glance, marketable surplus ratios (MSR) in MP and RJ under gram were 93.3 and 94.14 percent respectively. In mustard, the MSR were 97.3 percent and 94.02 percent respectively in MP and RJ respectively. Survey findings are similar.

Figure 8: Marketable surplus generated by farmers (% of production)



Source: Arcus Policy Research | Note: Farmer categories are based on total operated land with the farmer.

2. How does farmer sell?

Monthly crop disposal pattern is calculated for different land holding sizes and then weighted averaged for a crop in the state. The 'overall' pattern of monthly disposal was estimated as the weighted average of monthly disposal pattern where share of different land-holding sizes in the sample were considered as weights in the two states.

Data suggests that gram farmers in both the states sold their crops till the October (onset of the upcoming sowing season). In Madhya Pradesh, about 98 percent of the sold was sold between February and October. This number was 96 percent in Rajasthan. In case of mustard, in Madhya Pradesh, between February and October about 99 percent of the crop was sold. Off this, 95 percent of the crop was sold by July. Whereas, in Rajasthan, mustard farmers sold crops across a longer duration. Between February and July, in Rajasthan about 90 percent of the crop was sold. The rest 10 percent was sold December and January (Figure 9).

Overall, considering monthly crop disposal patterns of farmers with different land holding sizes, no significant variation was found in case of gram farmers in both Madhya Pradesh and Rajasthan. Only slight variations were reported in monthly sale pattern of SMF compared to medium and large farmers in case of both gram and mustard farmers in Rajasthan. where slightly higher quantities were offloaded in the peak harvest months. When compared to the common perception that farmers offload their marketable surpluses rather quickly (within three months of harvest – March, April, and May), survey data suggests prolonged and staggered crop disposal patterns for both the crops in the two states.

Figure 9: Farmer monthly sale patterns (% of marketable surplus)



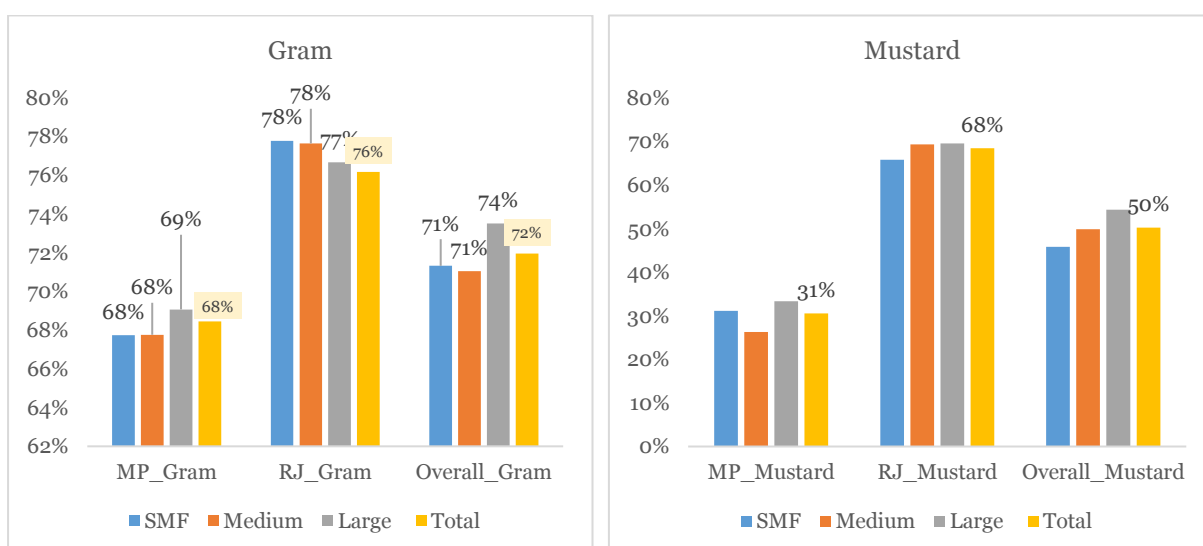
Source: Arcus Policy Research | Note: Common perception is assumed to have equal monthly disposal rate of 33% between March, April, and May.

3. Marketable surplus stored by farmers for staggered sale

As per survey responses, farmers in the two states harvested gram and mustard largely between late March and early April with market arrivals peaking in April and May. To understand the storage behaviour of the farmers the threshold month April was taken, where any quantity sold after April is considered as the quantity that the farmer stored before selling. To estimate the number of days for which the crop is stored, an additional 30 days have been added to the number of days the crop was stored to account for the storage days in April. This treatment is done to account for the harvesting patterns followed by farmers and the fact the if the farmers have harvested the crop in March end, and selling post April, he had stored the crop for the month of April.

It is estimated from the survey data that beyond April, at least 31 percent of the marketable surplus of mustard crop was held by farmers in Madhya Pradesh (Figure 10). This proportion was a 68 percent in Rajasthan. For gram, 72 percent of the marketable surplus was held back beyond the month of April in Madhya Pradesh and this proportion was about 76 percent in Rajasthan. Unlike common perception where farmers are believed to offload their marketable surpluses within few weeks of harvest, the results suggest that farmers held to their marketable surplus beyond the peak arrival time in April. SMFs cultivating gram are found to be holding higher shares of marketable surpluses post April but less so in mustard in the studied year.

Figure 10: Marketable surplus sold after April (% total marketable surplus)



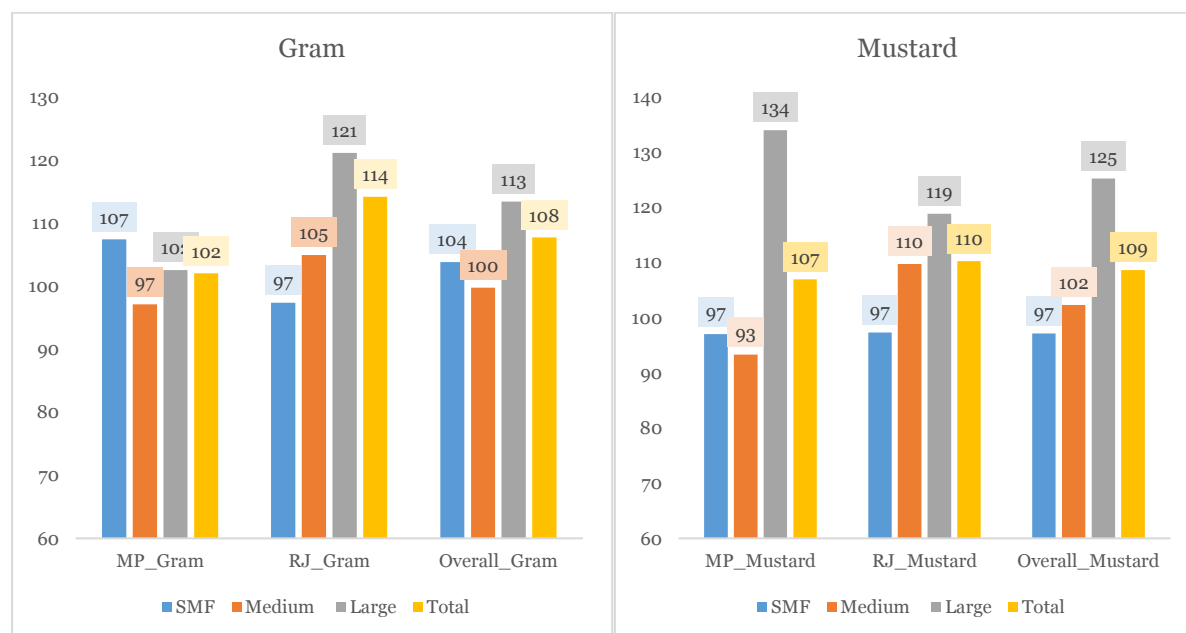
Source: Arcus Policy Research | Note: 'Total' is the weighted average of the average operated land size where share of different farmer types in total sample are considered are weights.

4. Average storing time of crops by farmers

For this marketable surplus sold after April, the number of days for which the crops were stored by the farmers were estimated. Number of days stored is the weighted average where quantity held in a month divided by total quantity held post April were considered as weights. It is found that on an average, farmers stored both crops on average for about 108-109 days post April.

Specifically, gram was studied to be held for 102 days (more than three months post-harvest) in Madhya Pradesh and 114 days (close to 4 months post-harvest) in Rajasthan. The mustard crop was also held for about 107 days in Madhya Pradesh and 110 days in Rajasthan (Figure 11). SMF farmers under both crops and states showcased similar behaviour as medium-sized land operating farmers.

Figure 11: Number of days crop was stored beyond April

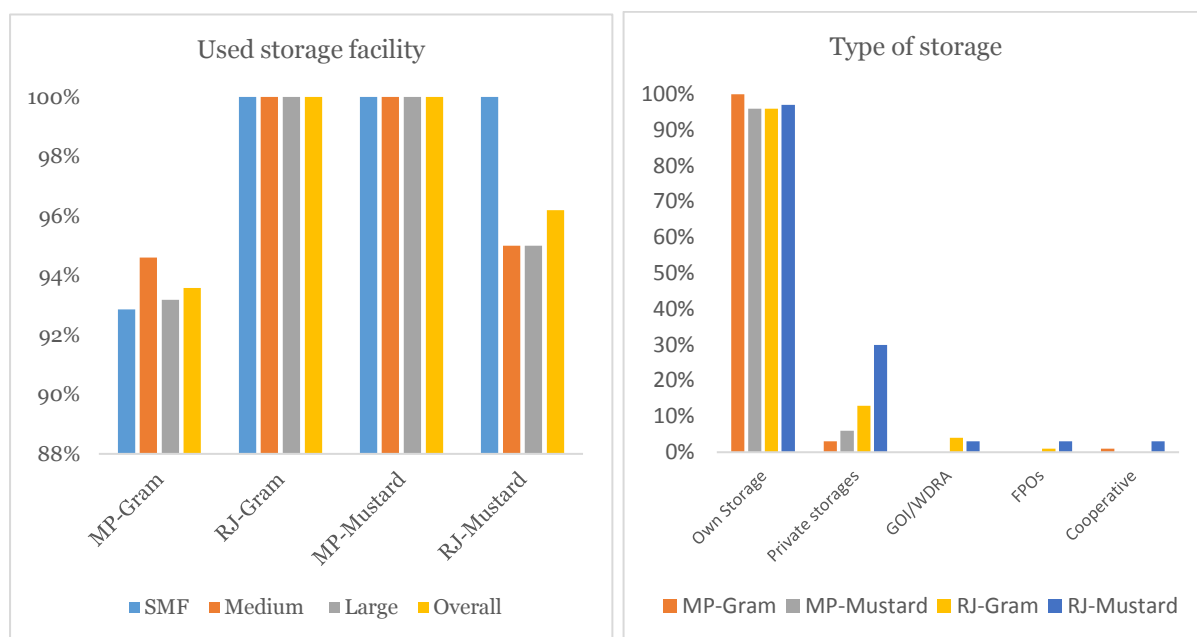


Source: Arcus Policy Research | Note: 'Total' is the weighted average of the average operated land size where share of different farmer types in total sample are considered are weights.

5. Access to storages

Most of the surveyed farmers in both the states reported that they retained a part of their produce for sale after the peak arrival season. Still high, but use of storage was relatively less by gram farmers in Madhya Pradesh. In terms of the type of storage, own storages were used the most, followed by private storages. Private storages and other GOI storages were mostly used by large farmers.

Figure 12: Proportion of Farmers who stored (percent respondents)



Source: Arcus Policy Research | Note: The data is for farmers who used storage facilities for more than 15 days post-harvest.

While the two states accounted for 35 percent of total registered WDRA warehouses in the country, high incidence of using own storage across land sizes suggests reluctance in usage of institutional/registered warehouses. The reasons for this were asked from the farmers and have been discussed below.

6. Why don't more farmers store in institutional/registered warehouses?

As mentioned above, most of the surveyed farmers did not use institutional warehouses such as Central Warehouse Corporation (CWC), State Warehousing Corporation, private, FPOs, Cooperative warehouses/storages. Farmers were asked questions on the reasons for why they do not store their produce in these facilities (Table 8). In case of both crops and states, high share of surveyed farmers reported that high minimum storage quantities required by warehouses were a deterrent for storing produce in such warehouses. In addition, except for gram farmers in MP, other farmers responded that, *inter alia*, high cost of storage and transaction costs involved in accessing the produce as and when required hampered their intent to store in institutional warehouses. Almost 75 percent surveyed mustard farmers in Madhya Pradesh said that instances of quality losses in institutional storages were another reason that they did not prefer storing in warehouses. The reasons stated by farmers included issues with warehouse management that lead to quality losses of farmers' produce in the warehouses. These issues included problems with moisture due to heavy rains, waterlogging in nearby areas, among others. This reason was reported as

a deterrent in using warehouses by almost 50 percent of MP gram and RJ gram and mustard farmers.

Table 8: Why farmers do not store in institutional storages

State	Crop	Reasons for not storing (% farmers who said yes to a reason)					
		High minimum storage quantity	High cost of storage and labour	Low flexibility in marketing decisions	High level of compliance	Instances of theft	Instances of quality losses
MP	Gram	50%	42%	36%	47%	47%	48%
MP	Mustard	70%	62%	72%	51%	37%	75%
RJ	Gram	63%	65%	60%	32%	41%	57%
RJ	Mustard	70%	76%	63%	77%	47%	52%

Source: Arcus Policy Research. Note: one respondent can say yes to one or more reasons and therefore, sum is greater than 100%.

7. When will farmers store for longer?

Surveyed farmers were also asked in which situations they will store the crops for longer (Table 9). Here, farmer responses were collected on options such as expectation of receiving high prices, access to finance to fulfil consumption needs, availability of reliable marketing information, significant crop surpluses, and indemnification from crop damage and losses when crop is stored for longer periods. Results suggest that above 80 percent of mustard farmers said that will store the crop for longer if there have a bumper crop. Farmers also reported that no access to affordable and timely finance was also a deterrent for farmers storing crop produce for longer suggesting that household cashflows in certain months can be crunched leading to premature sales that would ideally be preferred by the farmer. Mustard farmers in both MP (63 percent) and RJ (74 percent) stated that availability of credible market intelligence can help them plan their marketing (thus storage patterns better) suggesting that price discovery instruments such as future contract prices might help in better sense of price behaviour in coming months. This table shows that even if there is no access to finance, if prospect of higher prices, then farmers will store.

Table 9: Drivers for farmers to store crops for longer

State	Crop	Access to timely and affordable finance to fulfil consumption and other needs	Availability of reliable market information in future	Availability of large surpluses with the farmer	Indemnification from damage to crops in storage
MP	Gram	36%	39%	47%	50%
MP	Mustard	67%	63%	85%	81%
RJ	Gram	52%	43%	54%	60%
RJ	Mustard	68%	74%	86%	94%

Source: Arcus Policy Research. Note: one respondent can say yes to two or more reasons and therefore, sum is greater than 100%.

8. What restricted maximum returns on farmer incomes?

Responses were also collected on what the surveyed farmers thought about the returns generated by them on their marketable surpluses (Table 10). Fifty-four percent mustard farmers in MP and 64 percent mustard farmers in RJ reported that they were not able to generate maximum returns for their produce. Gram farmers in Rajasthan suggested that low prices paid by traders (85 percent farmers said yes to this), high volatility in prices, lack of procurement operations by the government, and government policies such as open imports and stocking limits also have suppressed prices received by them. Whereas, around 1/4th of gram farmers in Madhya Pradesh felt that unreliable marketing (price) information, market prices below MSP and government policies such as open imports and stocking limits have suppressed prices received by them.

Table 10: Farmers' perception about the prices received

State	Crop	Are you able to generate the maximum returns (respondents said NO)	Reasons					
			Unreliable market information	Cannot sell crop at MSP	Traders generally pay low than market prices	No direct procurement by government/private agencies	High volatility in market prices	Government policies (ECA, open imports) have suppressed market prices
MP	Gram	43%	28%	26%	23%	15%	21%	25%
MP	Mustard	54%	19%	20%	26%	23%	30%	31%
RJ	Gram	92%	12%	0%	85%	91%	87%	91%
RJ	Mustard	64%	32%	12%	60%	56%	53%	56%

Source: Arcus Policy Research Note: one respondent can say yes to two or more reasons and therefore, sum is greater than 100%.

Conclusions and Policy Implications

The following themes and conclusions emerge from the analysis presented above in the report.

- ***Farmers are aware of market trends, and they act to maximise their returns:*** Farmers closely monitored market prices of their crops, more so when harvest time is nearing. They invest time and resources in assessing market sentiments and finding information about future prices. Based on their best judgement, they decide their offer for sale.
- ***Farmers undertook staggered sale:*** Contrary to the widespread sentiment that farmers dumped their entire produce upon harvest, the study found evidence of staggered sale. Based on farmers' own perception of prices and behaviour of the fellow farmers, they decided the proportion of their surplus they were willing to offload at any particular time.
- ***Farmers stored crops for at least 3 months post-harvest but offloaded most of it before the next harvest:*** In case of mustard, about 34 percent of the mustard's marketable surplus (MS) was held back by farmers in Madhya Pradesh and this share was about 70 percent in Rajasthan. In case of gram, 69 percent of the marketable surplus was held back by Madhya Pradesh farmers and about 77 percent in Rajasthan. Farmers in Rajasthan took greater risks by storing both mustard and gram crops for longer when compared to farmers in Madhya Pradesh. Farmers on average, stored gram for 102 days (more than three months post-harvest in March) in Madhya Pradesh and 114 days (close to 4 months post-harvest) in Rajasthan. Whereas mustard crop was also held for about 107 days in Madhya Pradesh and 110 days in Rajasthan by farmers on average post-harvest. Before the onset of their next gram/mustard harvest, farmers usually emptied their previous crop stocks. Some medium and large farmers were found to carry-forward their gram stocks into the next year.
- ***Finding storages was not an issue:*** Above 95 percent of the surveyed farmers reported storing their gram and mustard crops in self-owned storages. Private storages were the second-best option. Private storages and other GOI storages were mostly used by large farmers.

- ***Problems with big storage houses and warehouses:*** Lack of large marketable surpluses and inflexibility in accessing their produce in big warehouses were impediments for farmers in accessing institutional and large private storages.
- ***SMF acted similar to medium or large farmers:*** A significant finding of our survey is that there was no significant difference in the staggered sale pattern between small and marginal farmers (SMF) and non-SMF farmers. Only a slight variation was reported in Rajasthan where SMF sold a slightly higher proportion during the peak harvest months.
- ***Sudden and ad-hoc trade restrictions by government reduced value-realization by the farmers:*** Farmers also believe that, inter alia, trade restricting government policies, particularly ones under EC Act and Foreign Trade (Development & Regulation) Act, 1992, adversely impacted the prices they receive on their stored crops, pulling down their incomes. A quarter of surveyed gram farmers in Madhya Pradesh and 91 percent gram farmers in Rajasthan reported that government policies impacted their incomes. In case of mustard, this percentage was 31 and 56 percent in Madhya Pradesh and Rajasthan.
- ***Most had access to short term credit:*** Access to credit improves a farmer's ability to take risk and thus delay his crop's sale while timing the market. About 90 percent of the surveyed sample farmers reported access to either institutional or non-institutional credit. In Madhya Pradesh, 94 and 99 percent of gram and mustard farmers respectively reported access to credit. In case of Rajasthan, this figure was 94 and 84 percent for gram and mustard respectively.
- ***Dearth of reliable market intelligence:*** At least 40 percent of all farmers in both states identified the need for relevant, credible, timely and free market intelligence which can help them plan their marketing (thus storage patterns better) suggesting that price discovery instruments such as future contract prices might help in better sense of price behaviour in coming months.

Based on these learnings, the following policy recommendations emerge.

- ***Essential Role of Future markets:*** The objective of making food affordable for all at all times would continue to guide government policies in times to come too. However, the almost automatic causality assumed by many, including policy makers, about the futures' market with high food inflation needs a rethink. Research (Aggarwal et al 2022) finds no causality between commodity trading and high food inflation. Commodity trading is critical to any country, more so,

when digital footprint is growing, and the farmers are willing and able to leverage it. From our study, we found evidence that farmers invested resources in accessing information about future prices. The fact that by mandate MSP is declared before the farmer takes his next crop sowing decision is testimony to the fact that farmers need an indication about future prices and Agri-future markets can play a critical role in that. Instead of banning such markets, concerted efforts are required to strategically deepen them so that with greater participation, farmers and other players in the value-chain can benefit from the trends it presents.

- ***Capacity Building of the policy makers and regulators:*** Given the critical role that futures market can play in empowering farmers and the others in the value-chain with insights about future prices of a crop, it is important that policy makers be educated and informed about the opportunities and challenges these markets offer. The officers of state/ central governments can be trained on using futures market for realising better prices by farmers. Trainings should be offered for key stakeholders. Commodity exchanges should also work in tandem with the government so to help the latter gain confidence in the activities of these markets.
- ***The pivotal Trio of Warehousing, NWRs and Credit:*** A farmer household's expenditures, like any other household, are spread across months in a year, however, his crop income is clustered around two or three cropping seasons. In which case, credit becomes integral for him (Saini, Hussain, and Khatri 2022). The need for timely access to affordable credit for farmers cannot be overemphasised. GOI and state government programs are rightly centred around ensuring access to credit for farmers. These programs are yielding results too (Gulati, Roy & Saini 2021). However, most loans till now focused on activities up until harvest, but now the focus is also required on post-harvest crop management too. We suggest the following:
 - Warehousing (Cold and Dry): Warehousing is crucial for storing agricultural produce after harvest. Cold storage is essential for perishable goods, while dry storage is suitable for non-perishable items. Prioritize the quality and efficiency of warehousing facilities. This includes proper temperature control for cold storage and appropriate conditions for dry storage.
 - Negotiable Warehouse Receipts (NWR): A NWR is a document that represents ownership of goods stored in a warehouse. It is negotiable, meaning it can be transferred from one party to another. It facilitates

trade and finance. It allows the holder to claim the stored goods, making it a valuable asset that can be used for various financial transactions.

- Post-Harvest Loans with Interest Subvention: Such loans are to be designed to meet the immediate cash needs of farmers after the harvest season. Interest subvention refers to the subsidy on the interest rate provided by the government. These loans help farmers manage expenses related to post-harvest activities, including storage, transportation, and marketing. Interest subvention makes the loans more affordable for farmers.
- Consider an integrated approach that combines warehousing, NWR, and post-harvest loans. This can create a streamlined system where farmers have access to funds using NWR as collateral, and the stored produce serves as security for loans.
- Risk Management: Assess and address potential risks, including quality control in warehousing, proper documentation, and regulation of NWR, and risk mitigation strategies for post-harvest loans, with a particular focus on needs of small and marginal farmers.

In summary, a robust post-production strategy should involve a comprehensive approach that ensures efficient warehousing, recognizes the value of negotiable warehouse receipts, and provides accessible post-harvest loans with interest subvention. This integrated strategy can contribute to the overall development and sustainability of the agricultural sector. Additionally, it is essential to promote awareness among farmers regarding post-harvest loans secured against Non-Warehouse Receipts (NWRs), and financial institutions should be encouraged to engage in the pledge loan system. The government should consider reassessing the guidelines and eligibility criteria for post-harvest subsidized loans, ensuring accessibility for small and marginal farmers, even if they have not obtained a crop loan.

- *Policy makers and their centrality*

- *Change required in government's perception of farmer marketing decisions:* our research suggests clear evidence of farmers storing and selling their produce in a staggered manner. Secondary evidence also provides evidence of farmers bodies like farmer producer companies or organizations (FPCs/FPOs) storing produce on behalf of farmers, to sell at later dates. This fact has to be acknowledged by the policy makers and their decisions to restrict trade should keep this dynamic in mind.

- *Ad-hocness in government policy actions must be reduced:* Knee-jerk policy actions affect everyone in the value-chain of a crop that takes years to build. A rule-based evidence-backed policy making will support everyone in the value-chain. It will not only bring greater agility to the process of policy making but it will also bring predictability to others in the value-chain.

To sum up, it is evident that contemporary farmers are making deliberate choices when it comes to selling their crops. The lack of economical and scientifically advanced storage facilities does not pose a significant obstacle if farmers identify profitable market prospects in the future. While farmers have a degree of empowerment in this regard, there is still room for improvement in their situation. The crucial factor lies in the predictability of government policies. The solution lies in expanding, rather than reducing, market options. Providing affordable storage facilities and reliable market intelligence will greatly contribute to fostering *samridh* farmers.

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