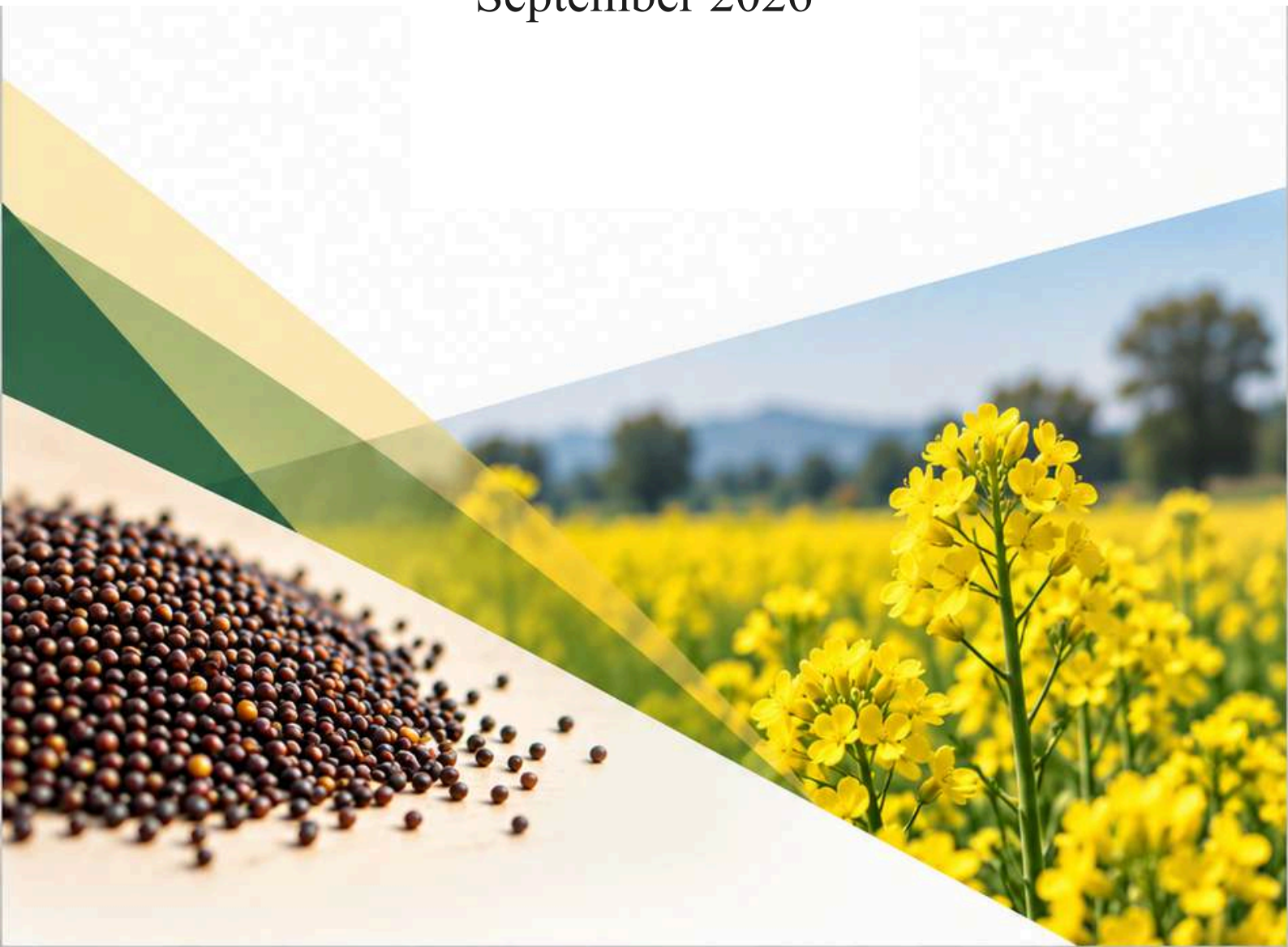
Unlocking the Potential of India's Mustard Sector

Technology, Productivity and Farmer Prosperity

September 2026



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Foreword

Mustard occupies an important place in India's oilseed economy, supporting millions of farmers and contributing significantly to the country's domestic edible oil availability. Strengthening the mustard sector, therefore, has significance well beyond the crop itself. It is closely linked to the objectives of enhancing farm incomes, improving agricultural productivity and advancing India's journey towards greater self-reliance in edible oils.

At the heart of this opportunity is the Indian farmer. Unlocking the full potential of mustard will require a sustained focus on improving productivity at the farm level through wider adoption of technology and modern agricultural practices. Access to quality inputs, high-yielding hybrid seed varieties, scientific agronomic practices, timely extension services and continuous capacity building can play an important role in enabling farmers to enhance yields, manage emerging challenges and improve farm returns. This farmer-centric approach assumes even greater importance in regions where technology adoption and access to knowledge remain relatively limited, as also highlighted by the findings of the survey undertaken across the three districts covered in this report.

The report brings out clear opportunities to bridge these gaps by taking technology, knowledge and agricultural services closer to farmers and translating them into tangible productivity gains. At the same time, unlocking the potential of the mustard sector will require strengthening the value chain beyond the farm. Greater procurement, improved storage and warehousing infrastructure, efficient price discovery, quality-based marketing and stronger linkages between farmers, markets and mustard-oil processing industries will be critical to building a more efficient, competitive and remunerative ecosystem.

A coordinated approach across technology, productivity, markets and value-chain development can create a virtuous cycle of higher yields, better realisation and improved farmer prosperity. Such an approach can not only strengthen the competitiveness of India's mustard sector but also contribute meaningfully to the country's broader edible oil security.

This report, prepared by FICCI in collaboration with the National Institute of Agricultural Marketing (NIAM), Jaipur, provides useful insights into the current state of the mustard sector and identifies practical opportunities for its transformation. I am confident that the findings and recommendations will contribute to a more informed dialogue among policymakers, industry, research institutions and other stakeholders, and help catalyse focused interventions for technology adoption, productivity enhancement and greater value creation for farmers.

I congratulate NIAM and the FICCI team for undertaking this important study and acknowledge the contributions of all stakeholders who have supported the preparation of the report. I hope this report serves as a useful reference for shaping the next phase of growth and development of India's mustard sector.

Jyoti Vij
Director General, FICCI

Message

Mustard occupies a significant position in India's oilseed economy and plays an important role in improving farmer incomes, supporting the edible-oil processing industry and strengthening India's edible-oil self-reliance. The study "Unlocking the Potential of India's Mustard Sector-Technology, Productivity and Farmer Prosperity", undertaken jointly by FICCI and CCS National Institute of Agricultural Marketing (CCS NIAM), provides an integrated assessment of the mustard value chain, covering production, productivity, hybrid-seed adoption, technology adoption, farmer income, procurement, marketing and processing. Based on a primary survey of 100 mustard farmers from Sri Ganganagar, Alwar and Rewari, the study brings valuable field-level perspectives on the opportunities and challenges facing mustard cultivation.

The findings indicate that technology adoption and hybridisation are emerging as important factors influencing mustard productivity. Scientific seed treatment, improved sowing methods, balanced nutrient management, efficient water management, weed control and integrated pest and disease management can contribute to better crop performance and reduced losses. At the same time, gaps in farmer awareness on hybrid seeds and continued dependence on conventional practices highlight the need for district-specific demonstrations, capacity-building programmes, quality seed availability and stronger extension support.

The study also emphasises that higher productivity must ultimately translate into better farmer income and stronger market returns. Strengthening procurement, storage, grading, market information, processing capacity and farmer–processor linkages is essential for improving price realisation and reducing distress sales. An integrated approach connecting improved seeds and technologies with scientific cultivation, higher productivity, lower crop losses, improved quality, better price realisation and stronger processing and marketing linkages can make the mustard sector more productive, resilient and remunerative. I congratulate FICCI, CCS NIAM and all those associated with this research initiative and hope that the findings will support policymakers, industry, researchers and farmers in building a competitive, technology-driven and farmer-centric mustard value chain that contributes meaningfully to India's edible-oil self-reliance.

Sh. Anoop Khinchi, IAS
Director General
CCS National Institute of Agricultural Marketing (CCS NIAM)

Acknowledgement

The Federation of Indian Chambers of Commerce and Industry (FICCI) acknowledges the **CCS National Institute of Agricultural Marketing (NIAM),** for undertaking the research and contributing to the preparation of this report on the mustard sector in Rajasthan and Haryana.

FICCI appreciates the expertise and valuable contribution of the NIAM team and extends sincere appreciation to **Sh. Anoop Khinchi, IAS**, Director General, CCS NIAM, for his guidance and institutional support in facilitating this research initiative.

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Executive Summary

The study "**Unlocking the Potential of India's Mustard Sector-Technology, Productivity and Farmer Prosperity"** was undertaken as a joint research initiative of FICCI and CCS National Institute of Agricultural Marketing (CCS NIAM), Jaipur, with the objective of developing an integrated understanding of India's mustard sector from farm-level production to processing and markets. The study examines the evolution of mustard area, production and productivity, adoption of hybrid seeds and improved agricultural technologies, farmer income, post-harvest management, marketable surplus, procurement, price realisation, processing and value-chain linkages. It combines secondary data analysis with a primary survey of 100 mustard farmers across Sri Ganganagar and Alwar districts of Rajasthan and Rewari district of Haryana, providing a field-level perspective on the opportunities and constraints affecting the mustard value chain.

The broader production evidence indicates that Indian mustard has moved beyond an acreage-driven growth trajectory, with productivity emerging as an increasingly important determinant of sustainable production growth. During 2015–16 to 2025–26, mustard area increased from 6.45 million hectares to 9.43 million hectares, while production increased from 5.92 million tonnes to 13.77 million tonnes and productivity improved from 0.92 to 1.46 tonnes per hectare. The state-level comparison, however, reveals an important divergence. **Rajasthan continues to provide the scale of production, but its productivity declined from 1,716 kg/ha in 2021–22 to 1,552 kg/ha in 2025–26, while Haryana recorded an increase from 1,914 kg/ha to 2,146 kg/ha over the same period.** Thus, Haryana demonstrates the potential of a productivity-led approach, whereas Rajasthan has considerable scope to raise output through productivity enhancement rather than relying primarily on expansion of cultivated area.

The primary survey provides a closer understanding of the factors behind this productivity difference. The surveyed farmers are relatively experienced, with an average age of 50.3 years, approximately 25.5 years of farming experience, and an average operational holding of 13.2 acres; nearly 98% of the cultivated area is under assured irrigation. The survey shows an increasing preference for hybrid mustard seeds, although adoption differs considerably across districts. **The latest district-level assessment indicates hybrid adoption of approximately 48-50% in Sri Ganganagar, 65-70% in Alwar and 75-80% in Rewari, making Rewari the most advanced among the surveyed locations.**

This difference is particularly significant when viewed alongside farm practices: Rewari farmers demonstrate stronger adoption of Good Agricultural Practices (GAP), scientific seed treatment and seed-drill-based sowing, whereas farmers in Sri Ganganagar and Alwar continue to depend comparatively more on conventional cultivation practices. The findings therefore indicate that differences in technology adoption and hybridisation are emerging as an important factor influencing mustard productivity across the two states. **Haryana has made stronger progress in adopting new technologies and hybridisation, coinciding with its improving productivity trend. Rajasthan, with comparatively lower adoption levels, presents significant scope to accelerate technology uptake and hybridisation to unlock further productivity gains.**

Farmers' decisions regarding hybrid seeds are largely driven by the perceived benefits of higher oil content, higher yield, early maturity and pest and disease resistance. At the same time, inadequate knowledge regarding oil content, yield advantages and pest and disease resistance remain important barriers to wider adoption. This suggests that increasing hybridisation will require more than simply improving seed availability. District-specific demonstrations, comparative field trials, oil-content testing, farmer training and affordable access to quality hybrid seed can help farmers understand the economic benefits of improved varieties and encourage wider adoption.

The study further establishes a clear relationship between technology adoption and farm-level economic outcomes. Farmers reported meaningful productivity improvements, with an estimated 12.9% increase in farm income and 23.0% reduction in crop losses. **These findings indicate that the benefits of technology extend beyond additional yield: improved seed, scientific seed treatment, timely sowing, balanced nutrient management, irrigation, weed management and integrated pest and disease management can simultaneously improve productivity and reduce production risks.** The emerging evidence indicates that the use of improved seeds and modern agricultural technologies encourages the adoption of better agronomic practices, which can enhance mustard productivity and reduce crop losses. These improvements can contribute to better crop quality and stronger price realisation, ultimately resulting in higher farmer income and improved profitability.

However, higher production does not automatically translate into higher farmer income unless the market side of the value chain is strengthened. The study identifies seasonal arrivals, price fluctuations, inadequate storage and weak procurement coverage as important constraints. The assessment indicates that only around 25% of mustard production is covered by government procurement, leaving a substantial proportion dependent on wholesale markets, where farmers may face prices below MSP during certain periods. This can compel farmers to sell during peak arrivals because of immediate cash requirements and limited storage capacity, reducing the benefits of higher productivity. Rajasthan, because of its large production base, particularly requires stronger procurement, warehouse facilities and direct processor linkages, while Haryana can benefit from stronger quality-based marketing, grading, market information and processor linkages.

The study consequently recommends an integrated, district-specific strategy rather than a uniform approach. Sri Ganganagar and Alwar require stronger technology demonstrations, extension support, scientific seed treatment, seed-drill-based sowing, balanced nutrient management and awareness regarding the benefits of hybrid seeds and GAP. Rewari, where adoption is comparatively stronger, should focus on consolidating and scaling existing good practices. Across all locations, timely availability of affordable quality hybrid seed, practical farmer training, digital and local-language extension, improved storage, stronger procurement, quality-based pricing and better farmer–processor linkages are required. Farmers also expect greater government procurement, improved price realisation in wholesale markets and the establishment or expansion of mustard oil-processing industries near major production clusters.

Overall, the study demonstrates that India's mustard sector has substantial potential to become more productive, competitive and remunerative, but this potential can be realised only through simultaneous improvements across the entire value chain. The central message emerging from the study is that mustard development should move from an acreage-oriented approach towards a productivity-, technology- and income-oriented model, in which improved hybrid seed and scientific cultivation lead to higher productivity and lower losses, while better storage, procurement, processing and market linkages ensure that these production gains are converted into higher farmer incomes. Such an integrated approach can strengthen farmer livelihoods, enhance domestic mustard-oil availability, improve the competitiveness of the mustard value chain and contribute meaningfully to India's broader objective of edible-oil self-reliance.

1. Introduction

Mustard (Brassica juncea L. and related Brassica species) is one of India's major oilseed crops belonging to the family Brassicaceae and is commonly known as mustard, rapeseed-mustard, rai, sarson and Indian mustard. It is cultivated primarily for its oil-rich seeds and protein-rich meal and has considerable importance in India's edible-oil economy. Mustard is widely grown in Asia and Europe, with India, China, Canada, Russia and the European Union being important producing regions. In India, Rajasthan, Uttar Pradesh, Haryana, Madhya Pradesh and West Bengal are major mustard-growing states. The crop is particularly suitable for dryland and semi-arid conditions and contributes to crop diversification, farm income and the edible-oil and feed industries. Mustard seed generally contains around 35–40% oil and 20–25% protein, while its processed products include edible oil, condiments, pickles, sauces and mustard cake/meal used as animal feed. The crop also has applications in biodiesel, pharmaceuticals, cosmetics, lubricants and other bio-based products.

1.1 Botanical Characteristics and Growth Stages

The botanical name of Indian mustard is Brassica juncea L.; it belongs to the family Brassicaceae and has a chromosome number of 2n = 36. Major mustard types include Indian mustard (B. juncea), yellow mustard (Sinapis alba), brown mustard (Brassica campestris) and black mustard (Brassica nigra). The crop generally progresses through germination, seedling, vegetative growth, flowering initiation, flowering, pod formation, seed filling and maturity. Germination occurs during 0–5 days after sowing (DAS), followed by seedling development during 6–15 DAS and rapid vegetative growth during 16–40 DAS. Flower initiation generally occurs around 41–50 DAS, followed by flowering during 51–70 DAS. Pod formation takes place around 71–90 DAS, seed filling during 91–110 DAS and maturity generally occurs around 111–130 DAS, when pods turn yellow-brown and seeds harden.

Table 1 Growth Stages of Mustard

No	Stage	Key Characteristics	DAS
1	Germination	Seed absorbs moisture and radicle emerges	0–5 DAS
2	Seedling Stage	Cotyledons and first true leaves appear	6–15 DAS
3	Vegetative Growth	Rapid leaf and stem development with branching	16–40 DAS
4	Flower Initiation	Flower buds start forming at terminal shoots	41–50 DAS
5	Flowering	Yellow flowers bloom and pollination occurs	51–70 DAS
6	Pod Formation	Siliqua (pods) develop after fertilization	71–90 DAS
7	Seed Filling	Seeds enlarge and accumulate oil content	91–110 DAS
8	Maturity	Leaves dry, pods turn yellow-brown and seeds harden	111–130 DAS

Source: ICAR-Directorate of Rapeseed-Mustard Research (DRMR)

1.2 Agro-Climatic and Agronomic Requirements

Mustard is primarily a Rabi crop and performs best under a cool and dry climate, with an ideal temperature range of approximately 15–25°C. Excess rainfall, waterlogging and frost during flowering can adversely affect productivity. Well-drained loam to clay-loam soils with a pH of about 6.0–8.0 are suitable. In North India, sowing is generally undertaken during October–November, while delayed sowing can reduce yield potential. Line sowing through a seed drill, with a seed rate of approximately 4–6 kg/ha, row spacing of 30–45 cm and sowing depth of 3–5 cm, supports uniform crop establishment. Scientific seed treatment with appropriate fungicide and biofertilizer culture helps improve germination and disease protection. Irrigation is particularly important at the flowering and pod-filling stages, while waterlogging should be avoided.

Nutrient management should preferably be based on soil testing, with balanced application of nitrogen, phosphorus and sulphur; the indicative recommendation provided is 60–80 kg N/ha and 40–60 kg P_2O_5/ha, with sulphur being beneficial for improving oil content. Weed competition is particularly important during 20–40 DAS, requiring timely interculture and appropriate herbicide management, including products such as pendimethalin where recommended. Overall, the production technology package indicates that timely sowing, quality seed, scientific seed treatment, balanced nutrition, efficient water management, effective weed control and appropriate crop-protection practices are central to achieving higher and more stable mustard productivity.

Table 2 Agro-Climatic & Agronomic Requirements

Particular	Key Details
Climate Requirement	Cool and dry climate preferred. Ideal temperature: 15–25°C. Excess rainfall and frost during flowering adversely affect yield.
Soil Type & Field Preparation	Well-drained loam to clay loam soils with pH 6.0–8.0 are suitable. Proper land leveling and drainage are essential.
Sowing Time	Rabi crop. North India: October to November. Delayed sowing reduces productivity.
Seed Rate & Sowing Method	Line sowing using seed drill. Seed rate: 4–6 kg/ha. Row spacing: 30–45 cm. Sowing depth: 3–5 cm.
Seed Treatment	Treat seed with fungicide and biofertilizer culture before sowing to improve germination and disease protection.
Water Management	Mostly irrigated crop. Critical stages: flowering and pod filling. Avoid waterlogging.
Fertilizer & Manure	Apply based on soil test. Recommended dose: 60–80 kg N/ha, 40–60 kg P_2O_5/ha, sulfur application beneficial for oil content improvement.
Weed Control	Critical weed competition period: 20–40 DAS. Pendimethalin and interculture operations commonly used.

Source: ICAR-Directorate of Rapeseed-Mustard Research (DRMR)

1.3 Major Pest and Diseases of Mustard

Mustard cultivation across different regions of India is affected by a range of diseases and insect pests, with their incidence varying according to agro-climatic conditions. In the major mustard-growing states of Rajasthan, Haryana and Punjab, important diseases include Alternaria blight, white rust and downy mildew, while major pests include mustard aphid, painted bug and sawfly. In Uttar Pradesh and Bihar, mustard is mainly affected by white rust, powdery mildew and Sclerotinia rot, along with pests such as aphids and leaf webber. In Madhya Pradesh and Gujarat, Alternaria blight and downy mildew are important diseases, while aphids and painted bug are major insect pests.

In West Bengal and Assam, white rust and leaf spot diseases are reported as important constraints, with mustard aphid and caterpillars being the major pests. Particularly in the dryland regions of Rajasthan, powdery mildew and Alternaria blight pose significant disease risks, while aphids and termites are important pest-related concerns. The regional variation highlights the need for location-specific crop protection strategies, including regular pest and disease surveillance, timely and appropriate plant-protection measures, integrated pest management (IPM), balanced crop nutrition and adoption of recommended Good Agricultural Practices to minimize yield losses and improve the stability of mustard production.

1.4 Harvesting and Post-Harvest Handling of Mustard

Harvesting of mustard should be undertaken when the pods turn yellowish-brown and the seeds become hard, with seed moisture at around 15 percent, as timely harvesting helps minimize field losses. Delayed harvesting can lead to pod shattering and significant seed loss. After harvesting, the crop is generally dried for 3–5 days before threshing, which may be carried out either manually or mechanically. The threshed grains should be properly cleaned and further sun-dried to reduce moisture to about 8–10 percent for safe storage. Finally, the mustard seed should be stored in dry, well-ventilated storage structures to maintain grain quality and minimize infestation by storage pests.

Table 3 Region Wise Major Diseases and Pests of Mustard

Region / States	Major Diseases	Major Pests
Rajasthan, Haryana, Punjab	Alternaria blight, White rust, Downy mildew	Mustard aphid, Painted bug, Sawfly
Uttar Pradesh, Bihar	White rust, Powdery mildew, Sclerotinia rot	Aphids, Leaf webber
Madhya Pradesh, Gujarat	Alternaria blight, Downy mildew	Aphids, Painted bug
West Bengal, Assam	White rust, Leaf spot diseases	Mustard aphid, Caterpillars
Rajasthan Dryland Regions	Powdery mildew, Alternaria blight	Aphids, Termites

Source: ICAR-Directorate of Rapeseed-Mustard Research (DRMR)

1.5 Crop Calender

The Mustard Crop Calendar – All India illustrates the major seasonal stages of rapeseed and mustard cultivation across India. Mustard is primarily a Rabi oilseed crop, with the sowing period generally extending from October to November, followed by crop growth during the winter season. The harvesting period typically ranges from February to May, depending on the region, variety, weather conditions, and time of sowing. The calendar highlights the broad national cultivation cycle and provides a simple visual reference for understanding the timing of mustard sowing and harvesting activities across India.

Figure 1 Crop Calendar of Rapeseed and Mustard

Mustard Crop Calender-ALL INDIA											
Season: Rabi						Crop: Rapeseed and Mustard					
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Harvesting Period									Sowing Period		

About the study

The study “Unlocking the Potential of India’s Mustard Sector-Technology, Productivity and Farmer Prosperity” was undertaken with the objective of developing a comprehensive and integrated understanding of India’s mustard sector and its value chain. The study examines the mustard sector from the farm level to the market, covering key dimensions such as area, production and productivity, cultivation practices, adoption of hybrid seeds and modern agricultural technologies, farmer income, post-harvest handling, marketable surplus, procurement, price realisation, processing and value-chain linkages.

It seeks to identify the major opportunities and constraints faced by mustard farmers and other stakeholders and to understand how improvements in production technologies, productivity, market access and value addition can strengthen the overall competitiveness of the sector. By bringing together industry perspectives, secondary sectoral trends and primary-level farmer insights, the study aims to provide an evidence-based assessment of the mustard value chain and identify practical interventions for improving farm-level returns, strengthening market linkages and contributing towards greater domestic availability of mustard oil and India’s broader goal of edible-oil self-reliance.

2. Objectives and Methodology

2.1 Objectives of the Study

The overall objective of the study is to assess the current and future potential of mustard in India's edible-oil sector and identify interventions for hybrid seeds, improving productivity, farmer income and domestic edible-oil security.

1. To assess the current and future demand for mustard and mustard oil in India, including consumption trends, major demand drivers and the projected demand–supply gap over the next 5–10 years.
2. To analyse mustard production and productivity trends over the last five years and assess the existing productivity gap, particularly in major mustard-producing states such as Rajasthan and Haryana.
3. To assess farmers' adoption of improved/hybrid mustard seeds and modern agronomic practices, including nutrient management, weed management, irrigation and pest and disease management, and identify major technology-adoption gaps.
4. To examine the impact of improved seed and production technologies on mustard yield and farmer income, including the comparative benefits of hybrid and non-hybrid varieties and the role of higher oil content.
5. To assess the effectiveness of existing MSP, procurement and market-support mechanisms and examine the potential for oil-content-based price incentives, improved procurement coverage and strengthening of processing and post-harvest infrastructure.
6. To examine the potential for geographical expansion and crop diversification of mustard, particularly in suitable non-core areas of eastern and southern India, to increase domestic mustard and edible-oil production.
7. To develop strategic recommendations for strengthening the mustard sector, focusing on productivity enhancement, improved seed and agronomy, post-harvest and procurement infrastructure, MSP/price support and appropriate policy measures to reduce India's dependence on imported edible oils.

2.2 Methodology of the Study

2.2.1 Research Design

The study adopts a descriptive and analytical research design to assess the production, productivity, technology adoption, income potential and constraints associated with mustard cultivation in India, with primary field-level evidence from Rajasthan and Haryana.

The study combines quantitative and qualitative approaches. Quantitative information has been collected from mustard farmers through a structured questionnaire, while qualitative information is generated through Focus Group Discussions (FGDs), key informant interactions and discussions with stakeholders involved in mustard production, procurement, processing and marketing.

2.2.2 Study Area

The primary survey was conducted in Rajasthan and Haryana, which are among the important mustard-producing regions of India.

Rajasthan

Rajasthan was selected because of its significant contribution to India's mustard production and the large area under mustard cultivation. The survey covered farmers from:

1. Alwar District
2. Sri Ganganagar District

These districts provide representation of different mustard production environments within the state.

Haryana

Haryana was selected because of its importance in mustard cultivation and relatively high productivity. The survey covered:

1. Rewari District

The selection of districts also provides an opportunity to compare farmers' adoption of improved seed and production practices across different production environments.

3. Farmer Profile and Survey Coverage

3.1 Farmers Profile

The primary survey covered 100 mustard farmers, providing a field-level perspective on the production, technology adoption, productivity and income dimensions of mustard cultivation. The average respondent is 50 years old, with around 25 years of farming experience, indicating that mustard cultivation in the surveyed regions is largely undertaken by experienced farmers who possess substantial knowledge of local production conditions. The average operational landholding is 13.2 acres, and nearly 98% of the cultivated area is under assured irrigation, providing a relatively favourable production environment for the crop.

Age Distribution

The age profile further reinforces the picture of an experienced farming community. Nearly three-fourths of the farmers are above 40 years of age, with farmers in the 41–50 and 51–60 age groups each accounting for 27%, while another 21% are above 60 years. Only 4% of respondents are aged 30 years or below and 21% fall in the 31–40 age group. This composition suggests that mustard cultivation in the surveyed regions continues to depend substantially on mature farmers with considerable accumulated farming experience. At the same time, the relatively limited representation of younger farmers highlights the importance of making agriculture attractive to the next generation. For technology dissemination, this farmer profile also suggests that field demonstrations, practical training, visual communication and farmer-to-farmer learning can play an important role alongside digital extension platforms.

Table 4 Distribution of Farmers by Age Group

Age Group (Years)	Farmers	Share (%)
≤30	4	4
31–40	21	21
41–50	27	27
51–60	27	27
>60	21	21
Total	**100**	**100**

Source: Primary Survey

Education Profile

Education adds another dimension to this farmer profile. The survey shows that 81% of farmers have school-level education, while 19% are graduates or postgraduates. The largest groups are those with middle-school, secondary and higher-secondary education. This indicates that farmers possess varying levels of formal education and, therefore, a single mode of knowledge dissemination may not be equally effective for everyone. A combination of demonstration-based extension, simple visual material, local-language communication and technically detailed information would therefore be more appropriate for promoting improved mustard production practices and new technologies.

Table 5 Distribution of Farmers by Education Level

Education Level	Farmers	Share
Primary (≤5th)	17	17%
Middle (6th–8th)	23	23%
Secondary (9th–10th)	20	20%
Higher Secondary (11th–12th)	21	21%
Graduate / Postgraduate	19	19%
Total	**100**	**100%**

Source: Primary Survey

Social Category

The social composition of the sample shows that OBC farmers constitute 61% of the respondents, followed by General-category farmers at 37%, while ST farmers account for 2%. This indicates that the survey captures a diverse social base. When this social profile is viewed together with age and education, the survey broadly represents an experienced farming population with varied educational backgrounds, providing a useful field-level context for understanding how mustard technologies, productivity practices and market-related interventions are received by farmers.

Table 6 Distribution of Farmers by Social Category

Category	Farmers	Share
OBC	61	61%
General	37	37%
ST	2	2%
Total	**100**	**100%**

Source: Primary Survey

Landholding Profile

The landholding pattern further explains the nature of the surveyed mustard-farming community. Forty-six percent of farmers operate more than 10 acres, while another 29% have holdings between 5.01 and 10 acres. Thus, 75% of the respondents operate more than five acres, whereas only 25% have holdings of five acres or less. The sample is therefore predominantly represented by medium and large landholders. This characteristic is important when interpreting subsequent findings on technology adoption, mechanisation, productivity and income, as farmers with relatively larger operational holdings may have greater capacity to adopt machinery, improved seed technologies and other modern production practices.

Table 7 Distribution of Farmers by Landholding Size

Landholding Group	Farmers	Share
≤2.5 acres	8	8%
2.51–5 acres	17	17%
5.01–10 acres	29	29%
>10 acres	46	46%
Total	**100**	**100%**

Source: Primary Survey

3.2 Survey Coverage

Geographically, the survey takes the survey provides farmer-level evidence across three districts in two important mustard-producing states—Rajasthan and Haryana. Rajasthan contributes the larger share of the sample, with Alwar accounting for 38 respondents and Sri Ganganagar for 30, while Rewari in Haryana contributes 32 respondents. Thus, the survey provides representation from different mustard-growing environments and allows farmer experiences from Rajasthan and Haryana to be viewed together. This geographical diversity becomes particularly relevant when examining differences in mustard area, production and productivity across the two states.

Table 8 Geographic Coverage

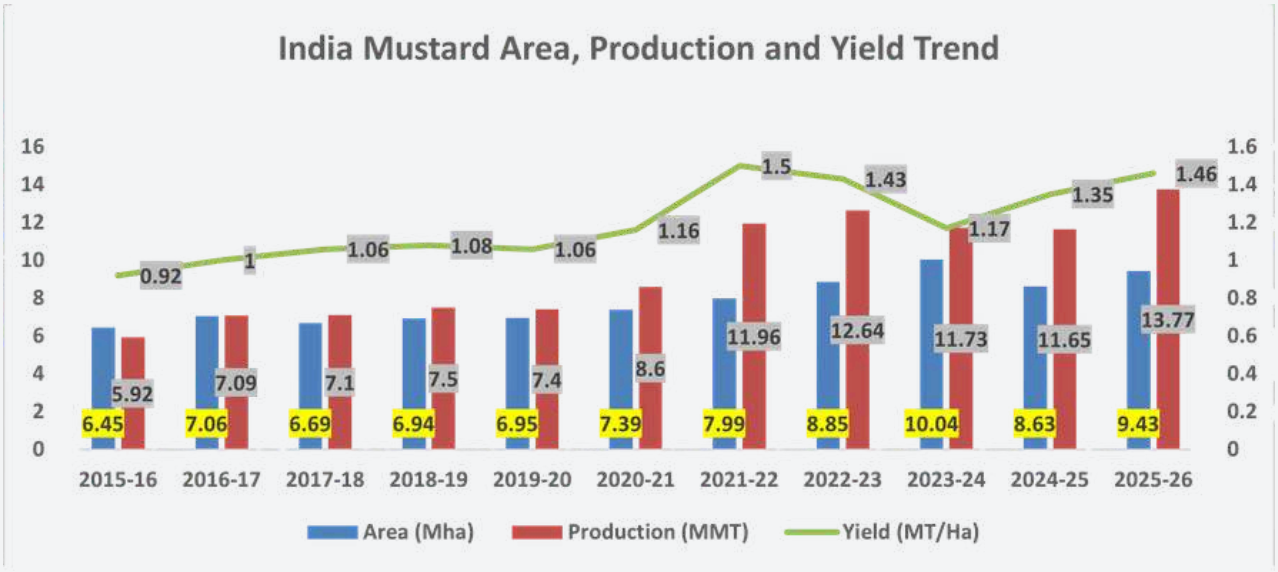
State	District Covered	No. of Respondents
Rajasthan	Alwar	38
Rajasthan	Sri Ganganagar	30
Haryana	Rewari	32
Total	**3 Districts**	**100**

Source: Primary Survey

4. Area, Production and Productivity of Mustard

4.1 All India Mustard Area, Production and Yield of Mustard

Figure 2 India Mustard Area, Production and Yield Trend



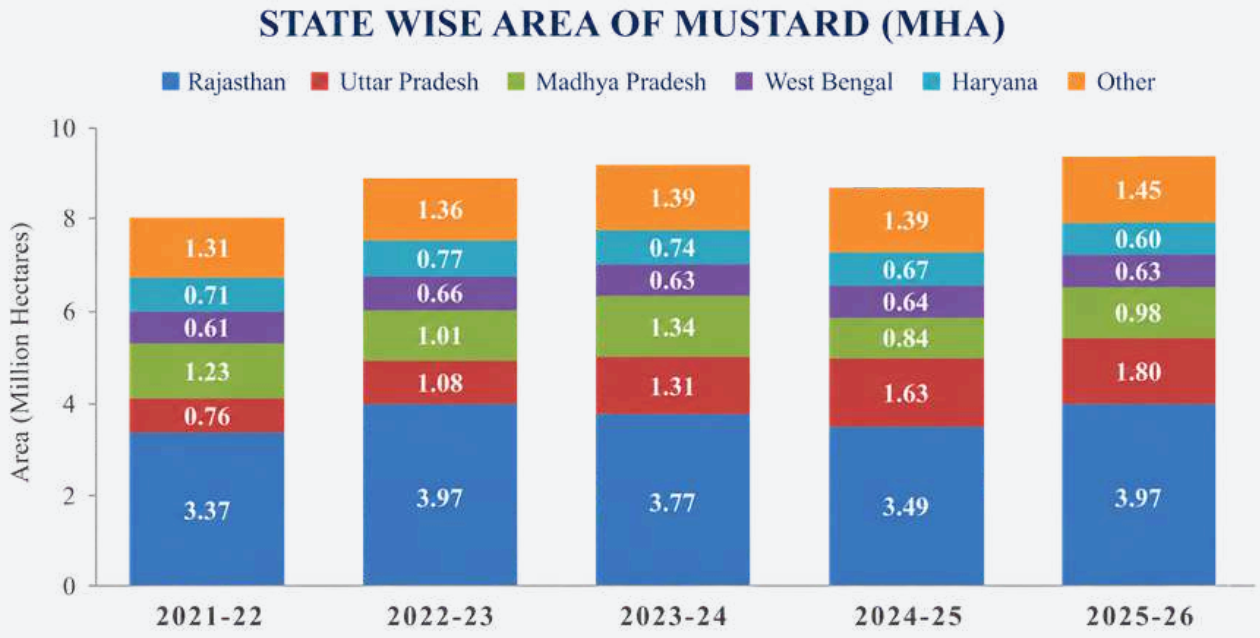
Source: SEA (Solvent Extractors' Association of India) and Analysis by Authors**.**

The farmer-level evidence becomes more meaningful when placed against the broader trajectory of India's mustard sector. At the national level, mustard cultivation has expanded considerably during 2015–16 to 2025–26. The area under mustard increased from 6.45 million hectares to 9.43 million hectares, representing an expansion of about 46.2%. However, the increase in production was considerably more pronounced: mustard output rose from 5.92 million metric tonnes to 13.77 million metric tonnes, an increase of approximately 132.6%. At the same time, productivity improved from 0.92 MT/ha to 1.46 MT/ha, representing a rise of around 58.7%. The difference in the pace of growth between area and production indicates that India’s mustard sector has not expanded merely by bringing more land under the crop; improvements in productivity have played an increasingly important role in expanding overall output.

4.2 State Wise Area of Mustard

This national expansion is closely linked with the changing geography of mustard cultivation. During 2021–22 to 2025–26, the area under mustard generally increased, reaching approximately 9.43 million hectares in 2025–26. Rajasthan continues to occupy the central position in India's mustard landscape, with around 3.97 million hectares under the crop in 2025–26. Uttar Pradesh has also strengthened its position, reaching approximately 1.80 million hectares, while Madhya Pradesh, West Bengal and Haryana contribute additional areas. The substantial contribution of the "Other" states further indicates that mustard cultivation is not confined to a few regions but has a wider geographical footprint across the country.

Figure 3 State Wise Area of Mustard

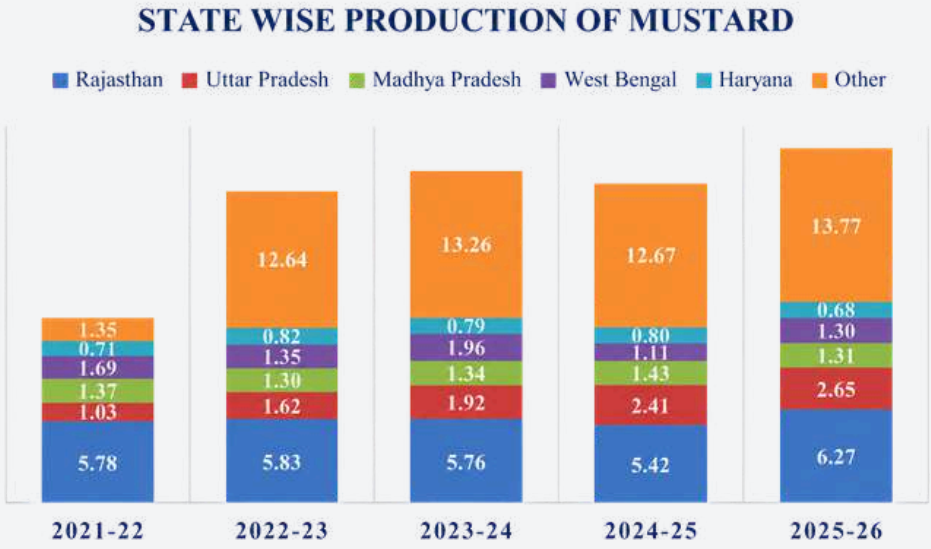


Source: UPAg and Analysis by Authors

4.3 State Wise Production of Mustard

The production broadly follows this expansion in area, although with notable differences among states. Rajasthan remains the leading mustard-producing state, with production increasing from 5.78 million tonnes in 2021–22 to 6.27 million tonnes in 2025–26. Uttar Pradesh has recorded particularly notable growth, with production increasing from 1.03 million tonnes to 2.65 million tonnes over the same period. Madhya Pradesh and West Bengal have maintained comparatively stable contributions, while Haryana continues to contribute a smaller but important share. Together, these developments indicate that the future growth of Indian mustard production will depend not only on maintaining acreage but also on enabling states with emerging potential to improve their productivity and production efficiency.

Figure 4 State Wise Production of Mustard

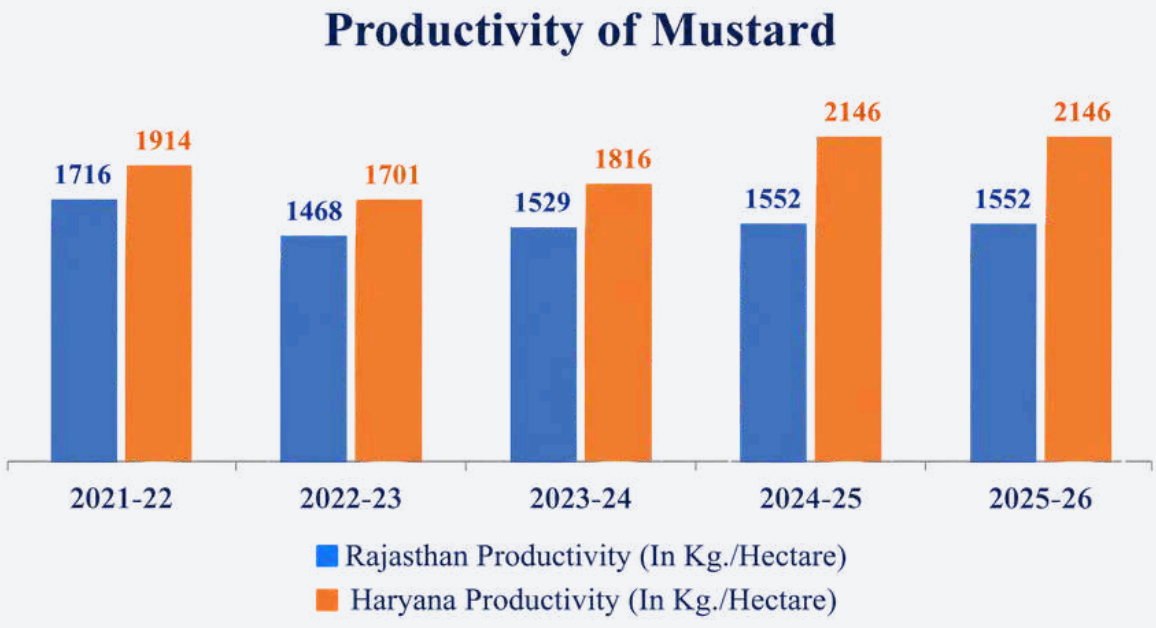


Source: UPAg and Analysis by Authors

4.4 State Wise Productivity of Mustard

The contrast between Rajasthan and Haryana becomes even sharper when it is viewed through productivity per hectare. Rajasthan, despite having a much larger mustard-growing area, recorded a decline in productivity from 1,716 kg/ha in 2021–22 to 1,552 kg/ha in 2025–26. The sharpest fall occurred in 2022–23, when productivity dropped to 1,468 kg/ha, before recovering gradually to 1,529 kg/ha in 2023–24 and 1,552 kg/ha in 2024–25 and 2025–26. Haryana, in contrast, started from a higher productivity level of 1,914 kg/ha in 2021–22, experienced a temporary decline to 1,701 kg/ha in 2022–23, and then recorded a steady recovery to 1,816 kg/ha in 2023–24 and 2,146 kg/ha in 2024–25, maintaining the same level in 2025–26. Thus, while Rajasthan's productivity remained below its initial level, Haryana not only recovered from its temporary decline but reached a level substantially higher than Rajasthan.

Figure 5 State Wise Productivity of Mustard



Source: UPAg and Analysis by Authors

This difference is important because it explains why Haryana was able to increase mustard production despite cultivating a smaller area, whereas Rajasthan's much larger acreage did not translate into corresponding production growth. The Haryana experience demonstrates the importance of yield-enhancing technologies, improved agronomic practices, timely sowing, balanced nutrient management, efficient crop protection and better input-use efficiency. For Rajasthan, where mustard occupies a much larger area, even a relatively small improvement in productivity could translate into a substantial increase in overall production.

This productivity also connects directly with the farmer-level findings of the study. The earlier survey analysis indicated that yield improvement following hybrid-seed adoption and technology-induced productivity improvement have the strongest association with estimated farmer income. Taken together, the evidence suggests that the next phase of mustard-sector growth should focus on productivity-led expansion—where improved seeds and technologies are not adopted merely as inputs, but are effectively translated into higher yields, better resource efficiency and ultimately higher farmer incomes.

4.5 CAGR of Area, Production and Productivity of Mustard in Rajasthan and Haryana

The comparison between Rajasthan and Haryana makes this productivity dimension even clearer. Rajasthan operates on a substantially larger mustard area, increasing from 33.66 lakh hectares in 2021–22 to 35.54 lakh hectares in 2025–26, but its production declined from 57.76 lakh tonnes to 55.15 lakh tonnes. The key reason lies in productivity, which declined from 1,716 kg/ha to 1,552 kg/ha, resulting in a 9.56% overall decline and a CAGR of −2.48% per annum. Rajasthan's experience therefore presents a clear challenge: its dominance in acreage does not automatically translate into sustained production growth unless productivity levels are maintained and improved.

Haryana presents a contrasting trend. Its mustard area declined from 7.13 lakh hectares to 6.72 lakh hectares, representing an overall decline of 5.75%. Yet, despite the reduction in area, production increased from 13.65 lakh tonnes to 14.42 lakh tonnes. This improvement was supported by a substantial increase in productivity—from 1,914 kg/ha to 2,146 kg/ha, equivalent to a 12.12% overall increase and a CAGR of 2.90% per annum. Haryana therefore demonstrates how productivity gains can compensate for relatively limited or declining acreage. Its experience provides an important lesson for the wider mustard sector: future production growth need not depend exclusively on expanding cultivated area; improving yield per hectare can be an equally, and potentially more, powerful pathway.

Taken together, the national and state-level evidence presents a clear evolution of India's mustard sector. The sector has moved beyond an acreage-driven growth towards one in which productivity increasingly determines the sustainability of production growth. Rajasthan provides the scale, Haryana demonstrates the potential of productivity-led growth, and the national trend shows that improvements in yield can substantially amplify the benefits of area expansion. This creates a natural bridge to the next part of the study—technology adoption, hybrid seeds, improved agronomic practices and their ability to translate productivity gains into higher farmer incomes.

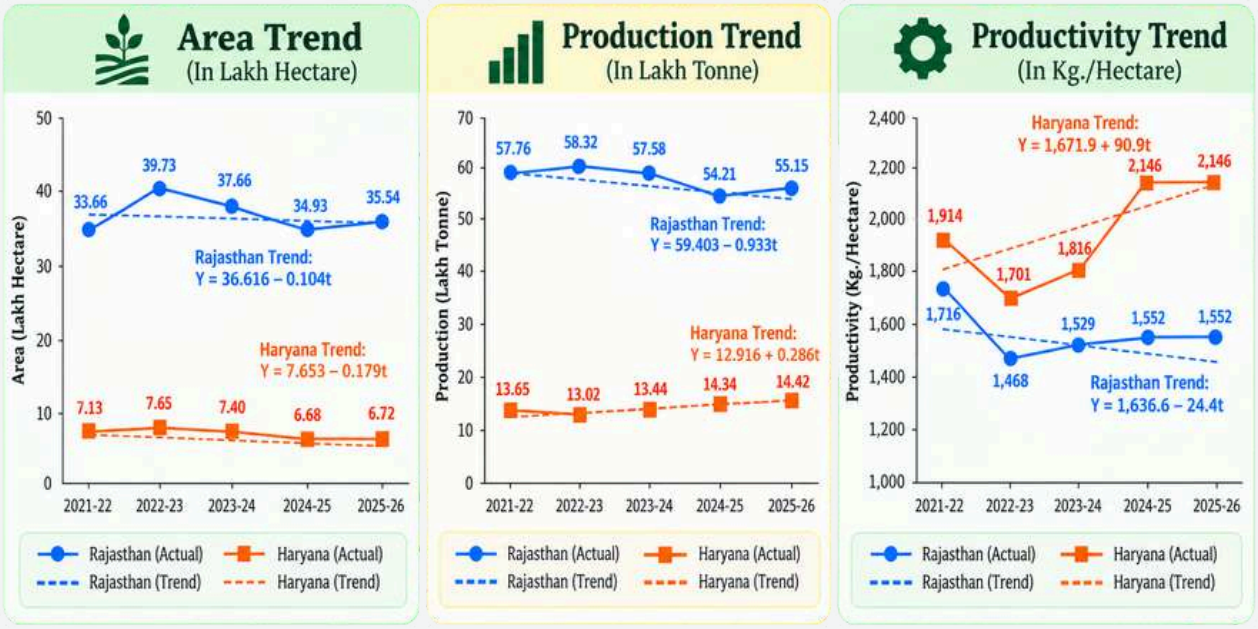
Table 9 CAGR of Area, Production and Productivity of Mustard in Rajasthan and Haryana

State	Indicator	2021–22	2025–26	Overall Change	CAGR
Rajasthan	Area (lakh ha)	33.66	35.54	5.59%	+1.37% p.a.
Haryana	Area (lakh ha)	7.13	6.72	−5.75%	−1.47% p.a.
Rajasthan	Production (lakh tonnes)	57.76	55.15	−4.52%	−1.15% p.a.
Haryana	Production (lakh tonnes)	13.65	14.42	5.64%	+1.38% p.a.
Rajasthan	Productivity (kg/ha)	1,716	1552	−9.56%	−2.48% p.a.
Haryana	Productivity (kg/ha)	1,914	2146	12.12%	+2.90% p.a.

Source: Ministry of Agriculture & Farmers Welfare, Govt. of India and analysis by author

4.6 Area, Production and Productivity Linear Trend

Figure 6 Area, Production and Productivity Linear Trend



Source: Author Analysis

Analysis of Mustard in Rajasthan and Haryana State

The trend equations provide a clear picture of the contrasting trajectory of mustard cultivation in Rajasthan and Haryana during the study period. In Rajasthan, the trend equation for area, Y = 36.616 − 0.104t, indicates a marginal declining trend in mustard area, while the production equation, Y = 59.403 − 0.933t, shows a more pronounced negative trend in production.

More importantly, the productivity equation, Y = 1,636.6 − 24.4t, indicates that mustard productivity in Rajasthan has been declining by about 24.4 kg/ha per time period according to the fitted trend. This combination suggests that Rajasthan, despite being a major mustard-producing state with a large cultivation base, faces a need to strengthen productivity and technology-led growth rather than relying primarily on acreage. In contrast, Haryana shows a distinctly positive trajectory: its area equation, Y = 7.653 − 0.179t, indicates a slight decline in cultivated area, but this has been accompanied by positive trends in both production and productivity. The production equation, Y = 12.916 + 0.286t, indicates an increasing production trend, while the productivity equation, Y = 1,671.9 + 90.9t, reflects a strong improvement in yield of approximately 90.9 kg/ha per time period. Thus, the equations highlight an important structural difference between the two states: Rajasthan's mustard sector is experiencing pressure from declining production and productivity trends, whereas Haryana is achieving higher production primarily through substantial productivity improvement despite a relatively smaller area base. The findings reinforce the need for Rajasthan to accelerate adoption of improved/hybrid seeds, scientific seed treatment, improved sowing methods, balanced nutrient management, efficient irrigation, integrated pest and disease management and other Good Agricultural Practices. At the same time, Haryana's positive productivity trend provides a useful indication of the potential gains that can be achieved through stronger technology adoption and improved farm practices.

Table 10 Linear Trend Equations

Indicator	Rajasthan	Haryana
Area (lakh ha)	Y = 36.616 − 0.104t	Y = 7.653 − 0.179t
Production (lakh tonne)	Y = 59.403 − 0.933t	Y = 12.916 + 0.286t
Productivity (kg/ha)	Y = 1,636.6 − 24.4t	Y = 1,671.9 + 90.9t

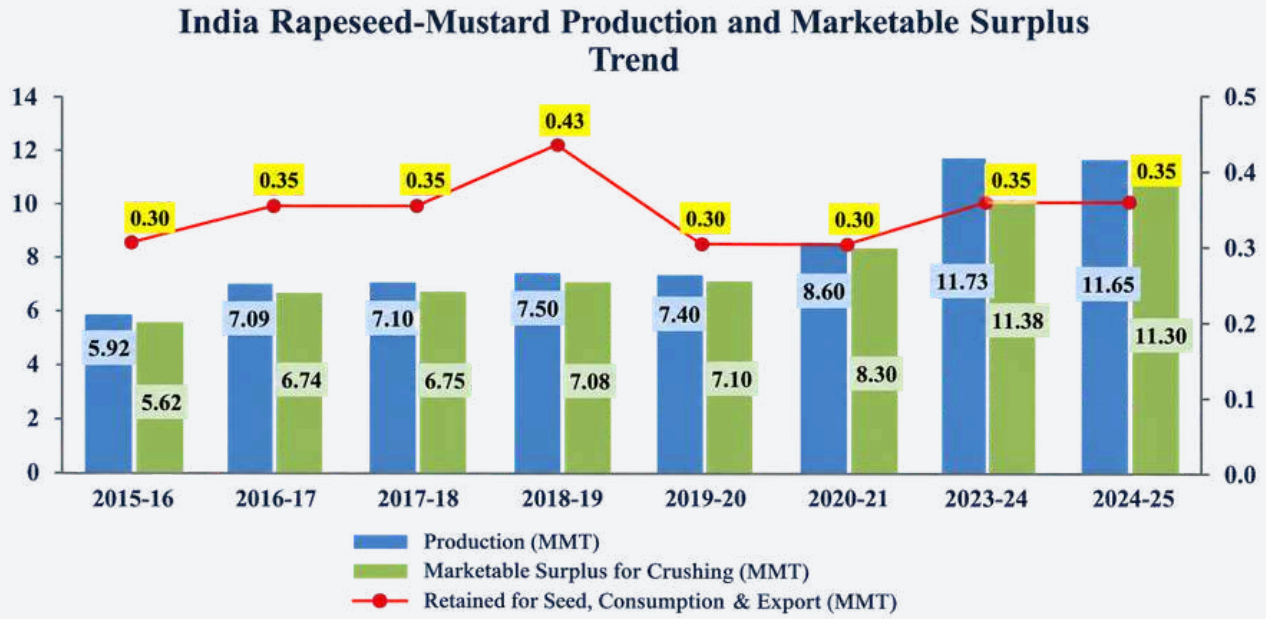
Note: t = 1 for 2021–22, 2 for 2022–23, 3 for 2023–24, 4 for 2024–25 and 5 for 2025–26. The equations represent linear trends fitted to the five observations and are not official forecasts.

4.7 India Rapeseed-Mustard Production and Marketable Surplus Trend

The expanding rapeseed-mustard production base in India and the availability of mustard for crushing, while also showing the relatively small quantity retained for seed, domestic consumption and exports. Production increased from 5.92 MMT in 2015–16 to 7.09 MMT in 2016–17, remained around 7 MMT during 2017–18 and 2018–19, and then increased substantially to 8.60 MMT in 2020–21 and further to 11.73 MMT in 2023–24, remaining high at 11.65 MMT in 2024–25. Correspondingly, the marketable surplus available for crushing increased from 5.62 MMT in 2015–16 to 6.74 MMT in 2016–17, reached 7.08 MMT in 2018–19, and subsequently rose to 8.30 MMT in 2020–21 and more than 11.3 MMT during 2023–24 and 2024–25.

This indicates that the growth in mustard production is translating largely into increased availability of seed for the oil-crushing and processing industry, creating a stronger domestic raw-material base for mustard oil production. At the same time, the quantity retained for seed, consumption and exports has remained comparatively small, generally around 0.30–0.35 MMT, with a temporary increase to 0.43 MMT in 2018–19. The narrowing difference between total production and marketable surplus in the later years suggests that a very large proportion of the mustard produced is entering the marketable/crushing channel. This creates an important opportunity for India to strengthen domestic mustard-oil processing, value addition, organized procurement and farmer–processor linkages, thereby converting increased mustard availability into higher value realization. However, the trend also highlights the importance of ensuring adequate storage, efficient procurement and remunerative market mechanisms so that the growing marketable surplus does not translate into harvest-time price pressure or distress sales by farmers.

Figure 7 India Mustard Production and Marketable Surplus Trend



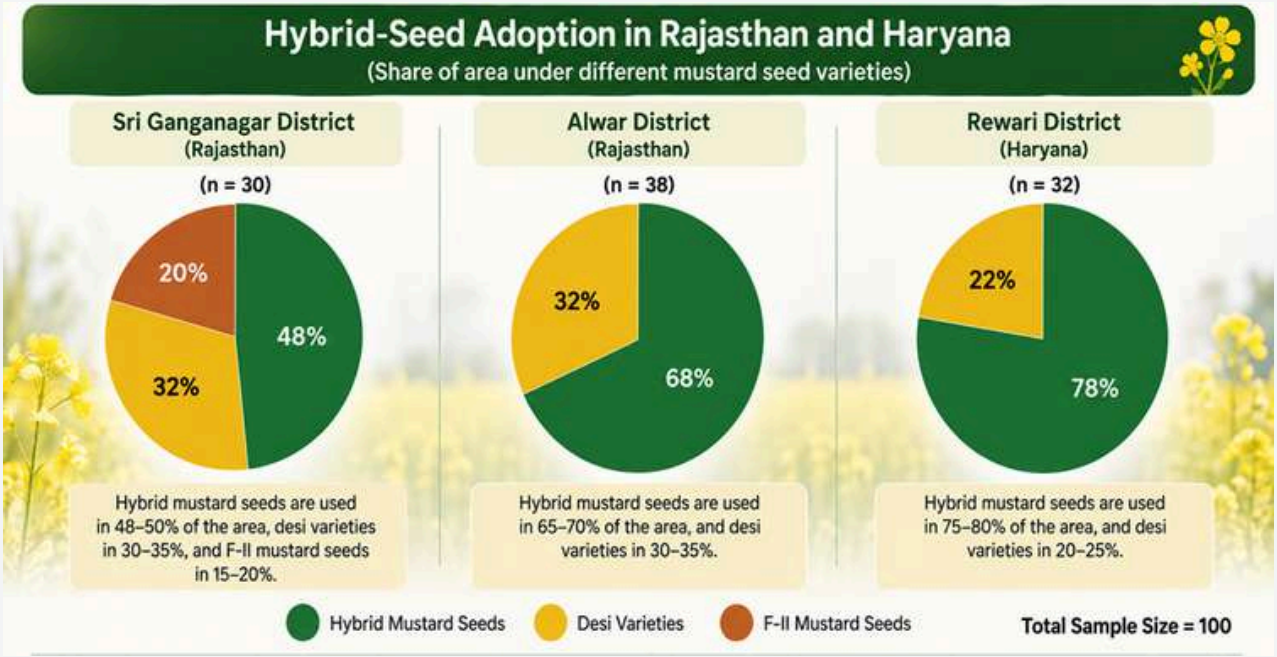
Source: Solvent Extractors' Association of India (SEA), Various Issues and Analysis by Authors

5. Primary Survey Findings

5.1 Hybrid-Seed Adoption in Rajasthan and Haryana State

The hybrid-seed adoption pattern shows a clear and strong preference for hybrid mustard seeds across all three surveyed districts, although the intensity of adoption varies by location. In Sri Ganganagar, hybrid seeds account for approximately 48–50% of the area under mustard, while 30–35% remains under desi varieties and around 15–20% under F-II mustard seeds. Alwar shows a higher level of hybrid adoption, with 65–70% of the area under hybrid seeds and the remaining 30–35% under desi varieties. The highest adoption is observed in Rewari, where approximately 75–80% of the mustard area is reported to be under hybrid seeds, compared with 20–25% under desi varieties. With a total sample of 100 farmers, these findings indicate a gradual movement away from traditional desi varieties towards improved hybrid seed technology, with Rewari emerging as the district showing the strongest adoption. The continued presence of desi varieties, particularly in Sri Ganganagar and Alwar, also indicates scope for further adoption of improved seed technologies through demonstrations, farmer awareness, assured availability of quality seed and extension support.

Figure 8 Hybrid-Seed Adoption



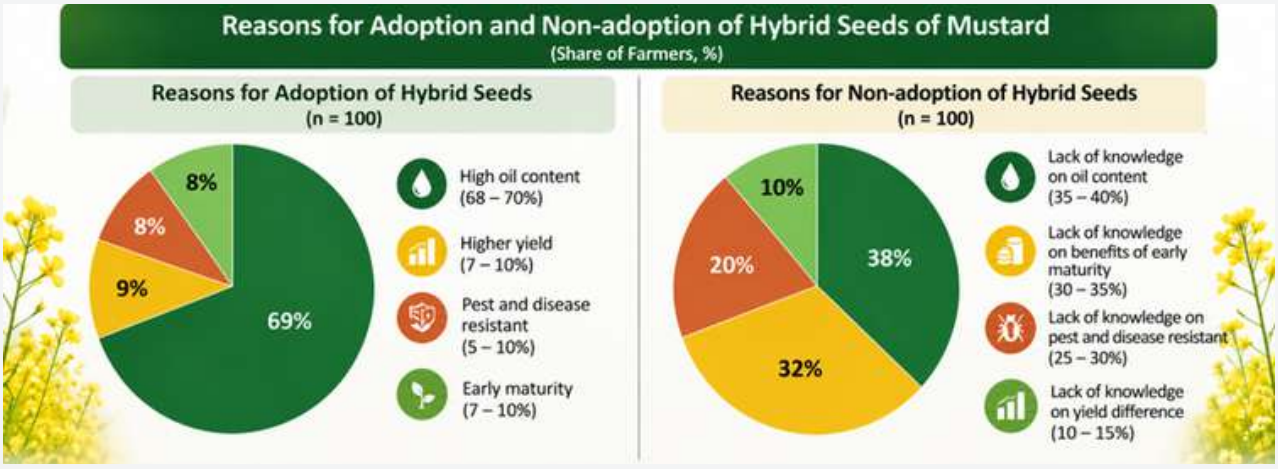
Source: Primary Survey and Authors Analysis

5.2 Reasons for Adoption and Non-adoption of Hybrid seeds of Mustard

The reasons for adopting and non-adopting hybrid mustard seeds provide an important insight into the decision-making process of the 100 surveyed farmers. Among farmers adopting hybrid seeds, high oil content emerges as the dominant reason, accounting for about 68–70% of responses, indicating that farmers place considerable importance on the quality and potential market value of mustard produced. Higher yield is another important consideration, cited by around 7–10% of farmers, while early maturity accounts for approximately 7–10% and pest and disease resistance for about 5–10%. This suggests that farmers generally recognise the benefits of hybrid seeds in terms of oil content, yield potential, crop duration and crop protection.

At the same time, the reasons given by farmers who do not adopt hybrid seeds point towards information and affordability barriers. Lack of knowledge about oil content (35–40%) followed by lack of knowledge on benefits of early maturity (30-35%), lack of knowledge regarding pest and disease resistance (25–30%). A smaller proportion, around 10-15%, reported lack of knowledge about yield differences as a reason for non-adoption. The findings therefore suggest that the challenge is not simply the availability of hybrid technology but also farmers' ability to understand and evaluate its economic benefits. This creates a clear opportunity for demonstration plots, comparative yield and oil-content demonstrations, farmer training, extension campaigns and greater awareness of pest and disease resistance.

Figure 9 Hybrid-Seed Adoption v/s Non-Hybrid-Seed Adoption



Source: Primary Survey and Authors Analysis

5.3 Agronomic Practices followed by farmers and Technology Gap

The findings emerging from the 100-farmer survey shows a distinct difference in the way mustard is cultivated across the three districts. Sri Ganganagar and Alwar continue to depend substantially on conventional farming practices, particularly in seed treatment and sowing, whereas Rewari demonstrates a more technology-oriented approach based on Good Agricultural Practices (GAP). In seed treatment, farmers in Sri Ganganagar and Alwar are reported to rely on conventional methods, while Rewari farmers are following a more proper and systematic seed-treatment approach. A similar pattern is visible in sowing: farmers in Sri Ganganagar and Alwar largely depend on mechanical/conventional sowing practices, whereas farmers in Rewari are using seed drills, which can support more uniform seed placement, spacing and timely establishment of the crop.

This difference in farm practices provides an important link to the productivity developed earlier in the report. The higher technology orientation observed in Rewari, particularly in seed treatment and seed-drill-based sowing, indicates a stronger movement towards Good Agricultural Practices, while Sri Ganganagar and Alwar still have considerable scope to transition from conventional methods towards more standardized and scientific cultivation. The objective should not simply be to introduce more technologies, but to ensure that the right technology is adopted at the right stage of crop production and that farmers understand its economic and productivity benefits.

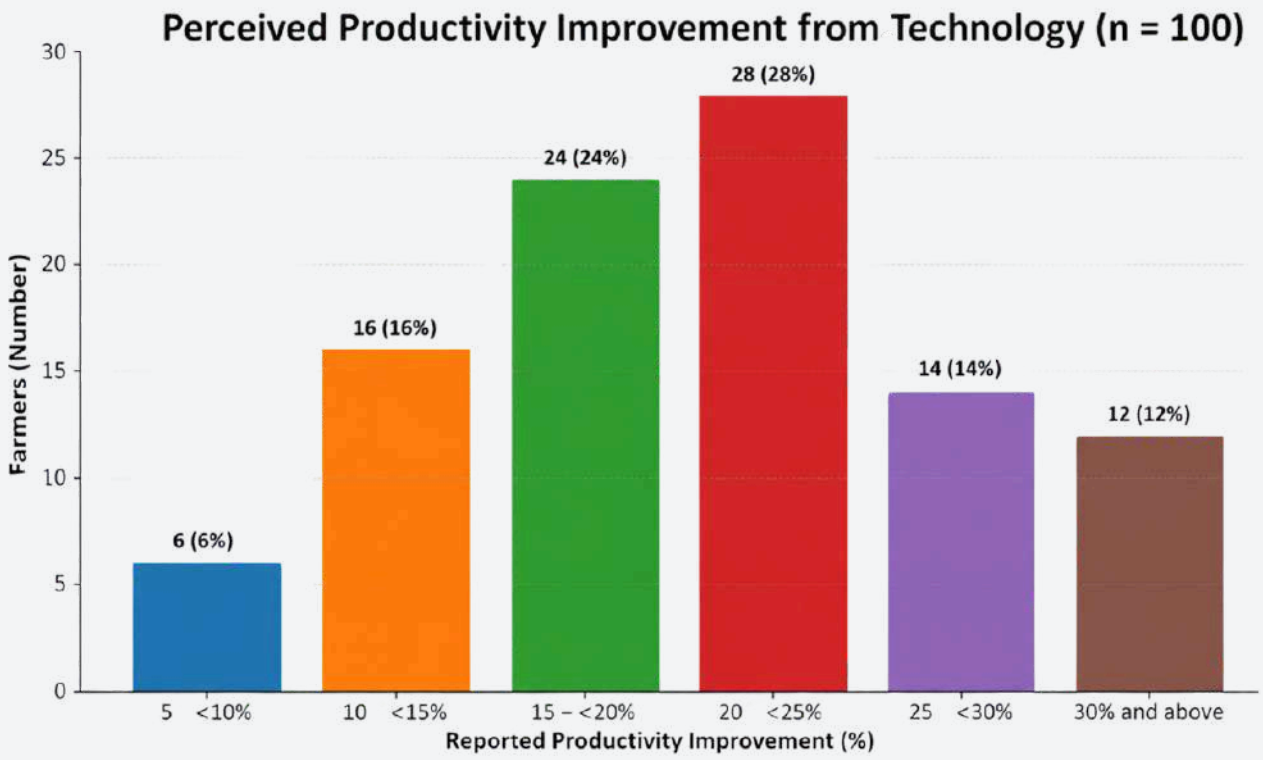
The technology gaps are therefore district-specific. In Sri Ganganagar and Alwar, priority should be given to demonstrations and extension support for scientific seed treatment, seed-drill sowing, recommended spacing, balanced nutrient management, efficient irrigation, integrated pest and disease management and improved weed management. These practices, when adopted together, can contribute to better crop establishment, healthier plants, improved resource-use efficiency and ultimately higher mustard productivity. In Rewari, where GAP-oriented practices are already more visible, the emphasis should be on consolidating these practices, improving their consistency and disseminating successful practices to neighbouring mustard-growing areas.

Table 11 Agronomic Practise and Technology Gap

Practice Domain	Sri Ganganagar	Alwar	Rewari	Technology Gap / Implication
Seed Treatment	Conventional method	Conventional method	Proper seed-treatment method	Sri Ganganagar and Alwar need standardized, recommendation-based seed treatment; Rewari practices can serve as a benchmark.
Sowing	Mechanical/ conventional sowing	Mechanical/ conventional sowing	Seed-drill based sowing	Greater adoption of seed drills is required in Sri Ganganagar and Alwar for uniform depth, spacing and timely sowing.
Overall Farm Practices	Predominantly conventional	Predominantly conventional	Good Agricultural Practices (GAP)	Technology and extension interventions need to be prioritized in Sri Ganganagar and Alwar, while GAP adoption in Rewari should be consolidated and scaled.
Productivity Orientation	Productivity Orientation	Scope for improvement through improved practices	More technology-oriented	District-specific packages should link improved seed, seed treatment, sowing, nutrient, irrigation and pest-management practices with productivity improvement.

Source: Primary Survey

Figure 10 Productivity Improvement from Technology



Source: Primary Survey

5.4 Productivity Improvement from Technology

The perception of productivity improvement from technology adoption provides a clear continuation of the mustard-sector by showing how farmers translate technology use into actual productivity gains at the field level. Among the 100 surveyed farmers, the largest group, 28 farmers (28%), reported productivity improvement in the range of 20–<25%, followed by 24 farmers (24%) reporting improvement of 15–<20%. A further 16 farmers (16%) observed gains of 10–<15%, while 14 farmers (14%) reported improvements of 25–<30% and 12 farmers (12%) experienced productivity gains of 30% or more. Only 6 farmers (6%) reported improvement in the relatively lower range of 5–<10%.

These findings strengthen the earlier observation that the transition from conventional farming towards Good Agricultural Practices (GAP) can become an important pathway for improving mustard productivity. The results suggest that farmers who adopt improved technologies can potentially achieve meaningful gains rather than marginal improvements. In practical terms, the productivity gains can be associated with a combination of improved seed and seed treatment, timely and uniform sowing through seed drills, balanced nutrient management, improved irrigation practices, appropriate weed management and scientific pest and disease management. The important point is that technology adoption works as a package rather than as an isolated intervention—the effectiveness of hybrid seeds and improved seed, for example, is likely to be greater when supported by proper seed treatment, appropriate sowing practices and effective crop management.

5.5 Income and Crop Loss Reduction

The findings indicate that technology adoption and improved agricultural practices are generating meaningful economic and risk-management benefits for mustard farmers. The farmers reported an average 12.9% increase in farm income, suggesting that the use of improved technologies and hybrid seeds is not only associated with higher productivity but is also translating into better economic returns. At the same time, the estimated 23.0% reduction in crop losses is particularly significant, indicating that improved agricultural practices may be helping farmers manage production risks and protect a larger share of their potential output. Taken together, these results suggest that technology adoption provides a dual benefit—improving farm profitability while reducing production losses. The findings therefore strengthen the case for promoting appropriate technologies, hybrid seeds and Good Agricultural Practices among mustard farmers, particularly in areas where conventional farming methods continue to dominate. By bridging these technology gaps through farmer training, demonstrations and timely extension support, the gains from improved productivity can potentially be converted into higher and more stable farm incomes, contributing to a more efficient and resilient mustard value chain and supporting India's broader objective of edible-oil self-reliance.

Table 12 Income and Crop Loss Reduction

Impact Measure	Mean (%)	Statistical Interpretation
Estimated income increase	12.90%	The reported average increase in farm income was 12.9%, suggesting that technology adoption and hybrid seeds are perceived to generate a positive economic return in addition to productivity gains.
Estimated crop-loss reduction	23.00%	Farmers estimated that technology adoption and good agricultural practises reduced crop losses by an average of 23.0%, indicating a potentially important contribution to production-risk management.

Source: Primary Survey

5.6 Market and Procurement constraints

The comparison highlights that mustard holds greater strategic importance in Rajasthan, where it is a major mustard-producing state and therefore faces substantial seasonal price pressure due to heavy arrivals during the harvest period. Haryana is also an important mustard-producing state, but its key market challenge is characterized more by seasonal arrivals and fluctuations in market prices. This creates different but complementary opportunities for strengthening the mustard value chain: Rajasthan has greater scope for expanding storage, procurement systems and direct linkages with processors, enabling farmers to avoid distress sales during peak arrivals, while Haryana can benefit from stronger quality-based marketing, grading, market information and processor linkages to improve price realization. Thus, the intervention strategy needs to reflect the specific market conditions of each state—strengthening warehouse and procurement infrastructure in Rajasthan and improving market intelligence, quality differentiation and value-chain connectivity in Haryana.

Table 13 State-wise Market Risks, Opportunities and Strategic Interventions for Mustard

Parameter	Rajasthan	Haryana
Importance of mustard	Very high; major mustard-producing state	Important mustard-producing state
Key price risk	Heavy seasonal arrivals and harvest-time price pressure	Seasonal arrivals and market-price fluctuations
Opportunity	Storage, procurement and direct processor linkages	Better quality-based marketing and processor linkages
Important intervention	Strengthen procurement and warehouse facilities	Strengthen market information, grading and value-chain linkages
Farmer strategy	Avoid distress sale during peak arrivals	Improve quality differentiation and market timing

Source: Primary Survey

6. Interpretation of the findings

The primary survey of 100 mustard farmers across Sri Ganganagar and Alwar in Rajasthan and Rewari in Haryana presents a mustard sector that is gradually moving towards improved seed and technology adoption, but at different speeds across the three districts. The surveyed farmers are largely experienced cultivators, with an average age of 50.3 years, around 25.5 years of farming experience, and an average operational holding of 13.2 acres; nearly 98% of the cultivated area is under assured irrigation. The sample is predominantly represented by medium and large farmers, with 75% operating more than five acres, providing a relatively strong base for adoption of improved farm technologies.

Against this farmer profile, the survey reveals a strong preference for improved hybrid mustard seed, although adoption varies across locations. Hybrid seeds account for approximately 48–50% in Sri Ganganagar, 65–70% in Alwar and 75–80% in Rewari, making Rewari the most technology-oriented of the three surveyed districts. Farmers' decision to adopt hybrids is driven primarily by their perception of higher oil content, followed by expectations of higher yield, early maturity and pest and disease resistance. However, the remaining dependence on desi varieties shows that the transition is not yet complete. The major barriers to wider adoption are inadequate knowledge about oil content, benefits of early maturity, yield advantage and pest and disease resistance. Thus, the challenge is not simply making improved seed available; farmers also need convincing field-level evidence of its economic advantage.

This seed-adoption naturally leads to the next issue—the quality of agronomic practices used alongside improved seed. Here, the survey reveals a distinct technology divide. Farmers in Sri Ganganagar and Alwar continue to rely largely on conventional methods, particularly for seed treatment and sowing, whereas Rewari farmers show greater adoption of Good Agricultural Practices (GAP). Rewari farmers' use of proper seed treatment and seed-drill-based sowing provides an important example of how improved practices can support better crop establishment, uniform spacing and timely sowing. In contrast, Sri Ganganagar and Alwar have considerable scope to move from conventional practices towards more scientific and integrated crop management.

The significance of this technology gap becomes clearer when farmers' reported productivity gains are considered. Among the 100 respondents, 78% reported productivity improvement of 15% or more, while 50% reported improvement of 20% or more following technology adoption. The largest group, 28%, reported productivity improvement of 20–<25%, followed by 24% reporting 15–<20%. This suggests that technology is not being viewed merely as an additional input but as a means of achieving meaningful yield improvement. However, the evidence also indicates that the greatest benefits are likely to emerge when technologies are adopted as an integrated package—improved seed combined with proper seed treatment, timely sowing, balanced nutrition, efficient irrigation, weed management and scientific pest and disease management.

The productivity gains then connect directly with the economic dimension of mustard cultivation. Farmers reported an estimated 12.9% increase in farm income, alongside an estimated 23.0% reduction in crop losses. This creates an important economic pathway in the survey: better technology and farm practices can improve productivity, reduce losses and ultimately strengthen farm income. The relatively higher reported reduction in crop losses also indicates that technology adoption has a risk-management dimension, helping farmers protect their potential output in addition to increasing yields. Thus, the value of technology should be assessed not only through additional production but also through the reduction of avoidable losses and improvement in income stability.

The district-level evidence becomes particularly important when these findings are placed against the broader production performance of Rajasthan and Haryana. Rajasthan remains the larger mustard-producing state, with much greater acreage, but its productivity declined from 1,716 kg/ha in 2021–22 to 1,552 kg/ha in 2025–26, contributing to a decline in production despite a modest increase in area. Haryana, on the other hand, cultivated a much smaller area, but productivity increased from 1,914 kg/ha to 2,146 kg/ha, allowing production to rise even as the area declined. The contrast demonstrates that acreage alone cannot ensure production growth; productivity is the critical lever.

However, market shows that producing more mustard does not automatically guarantee higher farmer income. Rajasthan's large production base exposes farmers to heavy seasonal arrivals and harvest-time price pressure, while Haryana faces seasonal market fluctuations. The survey therefore points towards the importance of storage, procurement, quality-based marketing, grading, market information and direct processor linkages. The situation becomes more critical because, as indicated in the assessment, government procurement covers only around 25% of mustard production, leaving the remaining produce largely dependent on wholesale-market channels where farmers can face prices below MSP during different periods. This limited procurement coverage can compel farmers to sell during periods of high arrivals and directly reduce their income and profitability.

Taken together, the primary survey tells that Indian mustard has considerable production potential, and farmers are increasingly recognising the value of hybrid seeds and improved technologies. However, adoption is uneven: Rewari demonstrates a stronger movement towards GAP-based cultivation, while Sri Ganganagar and Alwar still have substantial conventional-practice gaps. The productivity evidence suggests that closing these technology gaps can generate meaningful yield improvements, reduce crop losses and increase farmer income. Yet, these production gains must be matched by stronger market and procurement systems; otherwise, farmers may produce more but still fail to capture an adequate share of the value. The pathway emerging from the survey is therefore:

The mustard value chain follows an interconnected pathway in which the adoption of hybrid and improved seeds provides the foundation for better crop performance, which, when combined with scientific agronomic practices, can enhance crop growth and productivity. Improved seed quality, timely sowing, appropriate seed treatment, balanced nutrient management, efficient irrigation, and scientific pest and disease management together contribute to higher productivity and reduced crop losses. These productivity gains and lower production risks can translate into higher and more stable farmer incomes. However, achieving better farm-level returns also requires strengthening post-harvest storage, grading, aggregation and marketing systems, enabling farmers to avoid distress sales and obtain better price realisation. Improved market linkages, stronger procurement mechanisms and greater value addition through mustard processing can further strengthen the entire value chain. Thus, the integrated progression from improved seed adoption and scientific cultivation to higher productivity, lower losses, increased farmer income, efficient storage and marketing, and better price realisation can ultimately enhance the competitiveness and resilience of India’s mustard sector while supporting greater edible-oil self-reliance.

In this context, the priority should be to develop district-specific technology packages, with stronger demonstrations and extension support in Sri Ganganagar and Alwar, continued consolidation of GAP in Rewari, affordable access to quality hybrid seed, scientific seed treatment and sowing practices, and simultaneously stronger procurement, storage and processor linkages. Such an integrated approach can transform mustard cultivation from an acreage-driven production system into a productivity- and income-oriented value chain, strengthening both farmer livelihoods and India's objective of greater edible-oil self-reliance.

7. Farmer Suggestions and Expectations

The primary survey reflects that mustard farmers are looking beyond improvements in production alone and are seeking better price realization, stronger market support and greater access to knowledge and technology. The most important expectation is an increase in government procurement of mustard, as wider procurement coverage would provide farmers with greater assurance of remunerative prices and reduce the need for distress sales during the peak arrival period. Farmers also expect better price realization in wholesale markets, supported by transparent market information, effective grading and quality-based pricing so that the benefits of improved quality and higher productivity are reflected in the prices received by farmers.

Another important expectation is the establishment and expansion of mustard oil-processing industries near major production clusters. Greater processing capacity and direct linkages between farmers, processors and markets can reduce dependence on intermediaries, create local value addition and provide opportunities for farmers to obtain better returns from their produce. At the farm level, farmers also require regular capacity-building and training programmes on Good Agricultural Practices (GAP), improved cultivation techniques, hybrid-seed benefits and appropriate technology adoption. Such programmes should focus on practical demonstrations so that farmers can clearly understand the impact of improved seed treatment, seed-drill sowing, balanced nutrient management, irrigation, weed management and pest and disease management on yield and income.

Farmers also expect timely availability of quality hybrid seeds and other critical agricultural inputs at reasonable prices, as high input costs and inadequate awareness can discourage technology adoption. In addition, strengthening storage and warehouse facilities at the local level would enable farmers to hold their produce after harvest rather than being compelled to sell immediately when market arrivals are high.

8. Recommendations to Increase the Adoption of Hybrid Seeds and New Technologies

I.Establish District-Specific Hybrid Seed Demonstration Programmes

Large-scale front-line demonstrations and cluster demonstrations should be conducted in Sri Ganganagar and Alwar to show farmers the comparative performance of hybrid and conventional mustard varieties. Demonstrations should measure not only yield but also oil content, maturity period, pest and disease tolerance, cost of cultivation and net returns. Since high oil content is a major reason for hybrid adoption, demonstrating the economic value of higher oil content can be particularly effective.

II. Improve Availability and Affordability of Quality Hybrid Seeds

Knowledge on benefits of hybrid seeds has emerged as one of the major barriers to hybrid-seed adoption. Therefore, mechanisms should be developed to ensure timely availability of certified/quality hybrid seed, particularly before the sowing season. Public-sector institutions, seed agencies, FPOs and private seed companies can be encouraged to strengthen last-mile seed distribution. Where appropriate, seed-minikits or demonstration kits may be used to encourage first-time adoption.

III. Strengthen Farmer Capacity Building and Technology Literacy

Regular district-level training and capacity-building programmes should be organised on hybrid-seed selection, seed treatment, sowing methods, nutrient management, irrigation, weed control and integrated pest and disease management. Training should focus on practical field demonstrations rather than classroom-based information alone. Farmers should be shown the complete economic pathway from technology adoption, supported by improved agronomic practices, can enhance mustard productivity while reducing crop losses and production risks. These gains can translate into higher farm income, improved profitability and greater resilience of mustard cultivation The survey's reported productivity and income benefits provide a strong basis for such extension efforts.

IV. Promote an Integrated Good Agricultural Practices (GAP) Package

Technology adoption should not be promoted as an isolated intervention. Farmers should be encouraged to adopt a complete mustard production package, integrating hybrid seed, scientific seed treatment, seed-drill sowing, recommended plant population, balanced nutrient management, efficient irrigation, weed management and integrated pest and disease management. This integrated approach is particularly important because the survey indicates that technology adoption can contribute to productivity improvement and lower crop losses.

V. Strengthen Extension Through Digital and Local-Language Platforms

Technology recommendations should reach farmers through WhatsApp groups, mobile advisories, short videos, local-language messages, community radio and village-level extension programmes. Information should be provided at the appropriate crop stage—for example, seed treatment before sowing, irrigation advisories during critical crop stages and pest/disease alerts when required. This can address the information gaps identified among non-adopters.

VI. Link Technology Adoption with Market and Price Realisation

Farmers are more likely to adopt improved technologies when they can clearly see an economic return. Therefore, technology programmes should be linked with quality-based marketing, oil-content testing, grading, storage and direct processor linkages. Higher productivity alone may not improve farmer income if the additional produce is sold at unfavourable prices. The survey therefore supports an integrated approach connecting production technology with post-harvest management and market access.

VII.Strengthen Procurement and Storage Support

Improved production needs to be supported by a reliable market system. The assessment indicates that only around 25% of mustard production is covered by government procurement, leaving a substantial proportion exposed to wholesale-market price fluctuations and possible sales below MSP. Expanding procurement centres, improving timely procurement and payments, and strengthening warehouse facilities would provide farmers with greater confidence to adopt productivity-enhancing technologies without fearing distress sales.

09. Conclusion

The study concludes that the Indian mustard sector has substantial potential to increase productivity, farmer income and domestic edible-oil availability, but realizing this potential requires a shift from an acreage-driven approach towards a productivity-, technology- and market-oriented value chain. While mustard area and production have expanded at the national level, the state-level comparison shows that productivity remains the key determinant of sustainable production growth, with Haryana demonstrating the benefits of a productivity-led approach despite its smaller cultivated area. The primary survey of 100 farmers across Sri Ganganagar, Alwar and Rewari further confirms that farmers are increasingly adopting hybrid seeds and improved technologies, with Rewari showing relatively stronger adoption of Good Agricultural Practices, while Sri Ganganagar and Alwar continue to have significant technology gaps. Farmers reported meaningful productivity improvements, along with an estimated 12.9% increase in income and 23.0% reduction in crop losses, highlighting the economic potential of technology adoption. However, inadequate technical knowledge, continued dependence on conventional practices and weak market and procurement support remain important constraints.

Limited government procurement also exposes farmers to seasonal price fluctuations and distress sales, reducing the benefits of higher production. The study therefore emphasizes the need for district-specific technology interventions, affordable and quality hybrid seeds, scientific seed treatment, seed-drill-based sowing, Good Agricultural Practices, continuous farmer capacity building, stronger storage and processing infrastructure, better market linkages and expanded government procurement. An integrated approach linking improved seeds and modern agricultural technologies with higher productivity and lower crop losses can significantly strengthen the mustard value chain. Better quality and productivity can improve price realisation and farmer income, while stronger processing, storage and marketing systems can enhance value addition and market efficiency. Together, these interventions can make the mustard sector more productive, resilient and remunerative, strengthen farmer livelihoods, and contribute meaningfully to India’s goal of reducing dependence on imported edible oils and achieving greater edible-oil self-reliance.

About FICCI

Established in 1927, FICCI is the largest and oldest apex business organisation in India. Its history is closely interwoven with India's struggle for independence, its industrialization, and its emergence as one of the most rapidly growing global economies. A non-government, not-for-profit organisation, FICCI is the voice of India's business and industry. From influencing policy to encouraging debate, engaging with policy makers and civil society, FICCI articulates the views and concerns of industry. It serves its members from the Indian private and public corporate sectors and multinational companies, drawing its strength from diverse regional chambers of commerce and industry across states, reaching out to over 2,50,000 companies. FICCI provides a platform for networking and consensus building within and across sectors and is the first port of call for Indian industry, policy makers and the international business community

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About CCS NIAM

Established by the Government of India in August 1988, the Chaudhary Charan Singh National Institute of Agricultural Marketing (CCS NIAM) is a premier national-level autonomous institute under the Ministry of Agriculture & Farmers Welfare, Government of India, based in Jaipur. The Institute is dedicated to strengthening agricultural marketing systems through specialised training, research, education, consultancy and policy support, with a focus on improving the efficiency, inclusiveness and competitiveness of agricultural value chains.

CCS NIAM works closely with farmers, farmer organisations, government departments, agricultural marketing boards, cooperatives, agribusiness enterprises and other stakeholders to address emerging challenges in agricultural marketing. Its activities cover areas such as market infrastructure, post-harvest management, warehousing and storage, grading and standardisation, market information, value-chain development, commodity markets and market-led extension. Through applied research and consultancy, the Institute contributes evidence-based inputs for improving agricultural marketing policies and practices.

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