

Impact Evaluation of Project to Conduct Demonstration of Hybrid Mustard Seed for Income Generation of Farmers in Madhya Pradesh



**RKVY-Raftaar
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**Atal Bihari Vajpayee Institute of Good Governance and
Policy Analysis, Bhopal**

Project Team

Under the Guidance of:

Dr. Indrani Barpujari
Principal Advisor, (CSSD-AIGGPA)

Project Coordinator

Aamir Manan Deva
Advisor, (CSSD-AIGGPA)

Research Associate

Ms. Arpita Khare,

Field Investigators

Vidhya Kunwar -Mandsaur
Vishal Gupta - Shivpuri
Manish Sharma -Ashoknagar
Nikita Kunwar - Neemuch

Table of Contents

Project Team	1
Under the Guidance of:.....	1
List of Tables.....	3
Executive Summary:	5
Chapter 1: Introduction.....	6
1.1 Agriculture Profile of Madhya Pradesh.....	7
Chapter 2: About the Scheme & Implementation	10
2.1 Provisions of Demonstration	11
Chapter 3: Research Methodology	13
3.1 Literature review	13
3.2 Sampling Plan:	13
3.3 Beneficiary Interviews.....	14
3.4 Stakeholder Interviews	14
3.5 Data Collection and Analysis.....	14
3.6 Limitations	14
3.7 Ethical Considerations	14
3.8 Sampling Framework	14
3.9 Information of the Sampled Blocks and Villages.....	15
Chapter 4: Data Analysis and Discussion.	17
4.1 Scheme Guidelines Compliance, Challenges about Hybrid Mustard.	17
4.2 Dissemination of Scheme Information and Awareness about Hybrid Mustard	17
4.3 General Profile of the Beneficiaries.	17
4.3.1 Category of Beneficiaries	17
4.3.2 Educational Background	18
4.3.3 Occupational Status:	19
4.4 Financial Status of Beneficiaries	20
4.5 Land Holding Size of the Beneficiaries	21
4.6 Income from Primary Source	21
4.7 Engagement in Primary Source of Income.....	22
4.8 Reasons for cultivation of Common Mustard.....	23
4.9 Duration of Time Involved in Mustard Cultivation.....	24
4.10 Area of Land used for Cultivation of Mustard Crop.....	25
Chapter 5: Post Intervention and Implementation of the Scheme	26
5.1 Awareness about the Scheme	26
5.2 Reasons for Participating in the Demonstration.....	26
5.3 Activities during the demonstration	27
5.4 Average Cost of Cultivation of Mustard Crop	28
5.5 Average Production of Common Mustard befand after Demonstration	29
5.6 Average Income generated after demonstration of Hybrid Mustard	30
5.5 Adoption of Hybrid Mustard Variety for Cultivation	31
5.6 Change in the Area of Cultivation after Demonstration.....	32
Chapter 6: Challenges in Cultivation and Adoption of Hybrid Mustard seeds.....	34
6.1 Mustard Infestation as Major Challenge.....	34
6.2 Reasons for Challenges faced by Farmers Post Demonstration	35
Challenge 1: Newer Varieties with High Pest Resistance	35
Challenge 2: Seed Availability on Time and Seed Quality	36

Challenge 3: HYV Seeds with Dwarf Characteristics.....	36
Challenge 4: Fertilizer Subsidy and Availability of Ammonium Sulphate.....	36
6.3 Other Environmental Factors	36
2. Impact of Nilgai on Mustard Crop: Long Plant Height as a Destructive Factor	37
3. Impact of Parasite Weed on Mustard Crop:.....	38
Chapter 7: Key Findings & Recommendations	39
7.1 Key Findings.....	39
7.1.1 Dissemination of Scheme Information and Awareness:	39
7.1.2 General Profile of Beneficiaries:	39
7.1.3 Financial Status:	39
7.1.4 Land Holding Size:	39
7.1.5 Income from Primary Source:	39
7.1.6 Engagement in Primary Source of Income:	40
7.1.7 Reasons for Cultivating Mustard:	40
7.1.8 Duration of Time Involved in Mustard Cultivation:	40
7.1.9 Area of Land Used for Cultivation:.....	40
7.1.10 Average Production Before and After Demonstration:	40
7.1.11 Average Income Generated After Demonstration:	40
7.1.12 Adoption of Hybrid Mustard Variety:.....	40
7.1.13 Change in Cultivation Area After Demonstration:	41
7.2 Recommendations:	41

List of Tables

Table 1 Sampling Framework in all the Districts	15
Table 2 Information about Sampled blocks and villages.....	15
Table 3 Information about Awareness of the Scheme	26
Table 4 Average Production Common vs Hybrid Mustard	29
Table 5 Average income of beneficiaries (Pre & Post)	30
Table 7 Challenges faced by farmers after demonstration.....	35

List of Figures

Figure 1 Category of Beneficiaries	18
Figure 2 Educational Level of Beneficiaries	19
Figure 3 Occupational Status	19
Figure 4 Financial Status	20
Figure 5 Land Holding Size of Beneficiaries	21
Figure 6 Average Annual Income from Primary source (In Rs)	22
Figure 7 Engagement in Primary Source of Income.....	23
Figure 8 Reasons for cultivation of Mustard	23
Figure 9 Duration of Time Involved in Practicing Mustard Cultivation	24
Figure 10 Area used for Cultivation of Hybrid Mustard	25
Figure 11 Reasons for participation in demonstration.....	26
Figure 12 Average Cost of Cultivation (Rs/ha)	28
Figure 13 Change in the Area of cultivation after demonstration	33
Figure 14 Mustard Infestation in sampled districts.....	34

Executive Summary:

Mustard and rapeseed are globally significant crops cultivated in 53 countries. In India, mustard ranks second in oilseed importance after groundnut, with a crucial role in edible oil production. Despite being the world's third-largest mustard seed producer and second in cultivation area, India's average yield of 1.3 MT/ha lags behind the world average by 35%. This is attributed to the prevalent cultivation of low-yield Common Mustard varieties. In a bid to enhance income and employment opportunities, the Department of Farmers Welfare and Agriculture Development implemented the Hybrid Mustard variety Coral 432 (PAC 432) demonstration scheme across 10 districts in Madhya Pradesh under RKVY-Raftaar 2018-19.

This study, conducted as an Ex-Post Evaluation on the request of the Farmer Welfare and Agriculture Development Department, aims to gauge the overall impact of the Hybrid Mustard demonstration scheme on beneficiaries' intended attributes in Madhya Pradesh. A blend of qualitative and quantitative methods underpins the impact evaluation. Analysing primary data collected from 380 stratified random sample beneficiaries in four districts—Mandsaur, Neemuch, Ashoknagar, and Shivpuri—this research strategically covers both Bundelkhand and Malwa regions, focusing on districts where successful demonstrations of Hybrid Mustard seeds had occurred.

Although an ideal counterfactual assessment requires pre-demonstration and post-demonstration data, the absence of baseline information necessitates a comparative approach. This involves analysing beneficiary data concerning the cultivation of Hybrid Mustard and Common Mustard under similar conditions. Madhya Pradesh, a key mustard cultivation state, has enacted measures to promote mustard growth among farmers. Hybrid Mustard serves as a vital source of edible oil and fodder, adaptable to both Kharif and Rabi seasons as well as intercropping with Wheat and other Rabi crops. The key findings underscore the scheme's positive impact, attributing it to effective awareness dissemination. Beneficiaries exhibit diverse profiles, primarily from OBC backgrounds, with notable educational emphasis. While most are above the poverty line, vulnerabilities persist. Economic factors and adaptability drive Hybrid Mustard adoption, supported by higher production and profits, particularly in Mandsaur. The significant adoption rate of 65% showcases the scheme's success in encouraging farmers to transition from traditional to hybrid varieties. Seed availability remains a challenge influencing adoption choices.

Chapter 1: Introduction

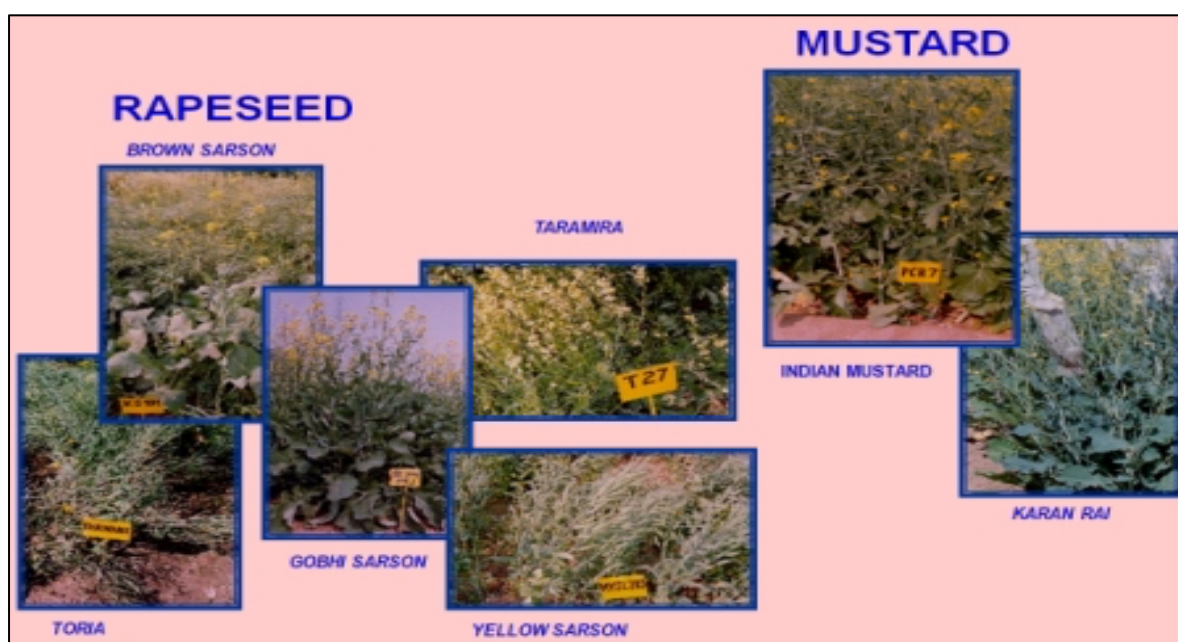
Mustard, (***Brassica juncea***) which belongs to the Brassica genus, is considered the third most important oilseed crop worldwide after soybean and groundnut. In India, mustard is the second most important oilseed crop after groundnut and is highly valued for its edible oil. Rapeseed and mustard are the major oilseed crops that have been traditionally grown throughout India due to their adaptability in diverse Agro-climatic conditions and conventional farming systems (*Annual Report, DoAFW 2012*). The rapeseed-mustard group includes eight different species: Indian mustard, toria, yellow sarson, brown sarson, gobhi Sarson, Karan Rai, black mustard, and taramira. Mustard and rapeseed are widely cultivated in 53 countries around the world, making them important crops on a global scale. These crops are grown in a wide range of climatic conditions and soil types, making them highly adaptable to different regions (*Chauhan et al. 2011*).

India is the 3rd largest producer of mustard seeds in the world, while being ranked 2nd in terms of cultivation area. With increasing focus on water conservation, mustard seeds have immense potential to replace water-intensive crops such as rice, wheat and sugarcane, as it is a less water-demanding crop and has multiple utilities in the form of oil, meal, and condiments (*Annual Report, DoAFW 2020-21*). Mustard seeds are emerging as a potential crop for increasing farmers' income and generating employment opportunities. However, the major issue of concern is that the average productivity in India is 1.3 MT/ha, which is 35 percent less compared to the world average (*Saini et al. 2021*). The majority of the farmers in India grow traditional mustard seed varieties that are suitable for consumption. Nevertheless, in recent years, farmers have started replacing traditional cultivars with newer, higher-yielding hybrid varieties (ICAR, 2022).

Mustard seeds in India are mainly grown during the Rabi season. Productivity of mustard seeds during Rabi season is comparatively higher (1059 kg/ha) than during Kharif season (929 kg/ha) due to controlled environmental conditions prevailing during Rabi season (*Kumar et al. (2008)*). Mustard seeds account for approximately 7% of the total cereal production in India. Interestingly, in recent years, the growth rate of mustard seed productivity in India has been increasing at a rate of over 20 kg/ha/year since 2010, which is the highest among food crops (*Sharma, (2022)*). This trend is expected to continue due to the increasing adoption of hybrid mustard seeds by farmers. According to report on Agricultural Statistics, the area under mustard seed cultivation in India has been steadily increasing since 2011-12, with a total area

of 6.35 million hectares in 2017-18, indicating the increasing popularity of this crop among farmers (DES, 2019).

Overall, mustard is an essential crop that is widely cultivated around the world due to its adaptability and importance as an oilseed crop. Its high adaptability makes it a popular choice for farmers in many regions, and its nutritional benefits make it an important food source for people worldwide.



The estimated area, production, and yield of rapeseed-mustard in the world was 36.59 million hectares (mha), 72.37 million tonnes (mt), and 1980 kg/ha, respectively, during 2018-19. Globally, During the last eight years, there has been a considerable increase (140 kg/ha) in productivity from 1840 kg/ha in 2010-11 to 1980 kg/ha in 2018-19 and production has also increased (10.78 mt) from 61.64 mt in 2010-11 to 72.42 mt in 2018-19. India accounts for 19.8 % and 9.8% of the total acreage and production. *Singh et al. (2019).*

1.1 Agriculture Profile of Madhya Pradesh

Madhya Pradesh, the second largest state in India, has almost half of its total land as cultivable, but only a fifth of it is irrigated. The state has a high proportion of its population, 35%, belonging to the SC and ST categories, who rely on rain-fed agriculture with low production and income (*MP Agricultural Profile 2020*). Marginal and small farmers, who comprise a significant portion of the state's farming community, struggle to achieve optimal yields due to various constraints. Nevertheless, the state has diverse Agro-climatic conditions and soil profiles, with 11 Agro-climatic zones (*NABARD, 2019*).

Madhya Pradesh is a top producer of various crops, such as Soybean, Bengal Gram, Black gram (Urad), Red gram (Tur), Maize, Sesame, Niger, and Green gram (Moong), and ranks third in the production of Wheat, Sorghum, and Barley *A report on Agricultural Profile* (2022). The state's major Kharif crops are Soybean, Paddy, and Maize, while Wheat, Gram, Peas, Lentils, Mustard, Sugarcane, and Linseed are sown abundantly during the Rabi season. In recent years, farmers have shifted to cash crops, such as cotton and soybean (*ICAR, 2018*).

Hybrid mustard seeds have been developed by crossing two genetically diverse parental lines, resulting in a new variety with desirable traits, such as high yield, improved disease resistance, and increased tolerance to environmental stresses. The use of hybrid mustard seeds can lead to increased crop productivity and improved crop quality *Gupta et al. (2011)*. In addition, the use of hybrid seeds can also reduce the input costs of farmers, such as fertilizer and water usage. This is because hybrid seeds require fewer resources to achieve high yields compared to traditional seeds *Upadhyay et al. (2014)*. In Short, the introduction of hybrid mustard seeds to farmers can significantly improve crop productivity and yield. Therefore, it is important to educate farmers about the benefits of using hybrid mustard seeds, and to encourage the adoption of this new technology in agriculture.

Mustard is a significant crop in Madhya Pradesh, and the state government has initiated several measures to encourage its cultivation among farmers. Hybrid Mustard is a vital source of edible oil and a fodder crop. It is grown during both Kharif and Rabi seasons and is an ideal intercrop with Wheat and other Rabi crops. Cultivating Hybrid Mustard can help farmers increase their income and improve their livelihoods, given the growing demand for mustard oil in the market (*Directorate of Oilseeds Development, 2019*).

According to the Directorate of Economics and Statistics, the total area under hybrid mustard seed cultivation has been steadily increasing in recent years. In 2018-19, the area under hybrid mustard seed cultivation was estimated to be 7.58 million hectares, with a production of 9.53 million tonnes. This represents a significant increase in both area and production compared to previous years. The productivity of hybrid mustard seeds has also been increasing steadily since 2018-19, with an overall increase of around 7.31 percent. These trends indicate the growing popularity and potential of hybrid mustard seeds in India, particularly in the Rabi season (*Directorate of Oilseeds Development, 2019*).

Hybrid mustard seeds have the potential to significantly increase production and productivity in agriculture, much like hybrid paddy, maize, and bajra *Rai et al. (2012)*, Therefore, it is important to introduce hybrid mustard seeds to farmers to improve the efficiency and effectiveness of crop yield.

Chapter 2: About the Scheme & Implementation

In the face of changing climate patterns and unpredictable rainfall in India, traditional cropping patterns are at high risk, and crop diversification through the cultivation of hybrid crops like mustard is a promising solution. Mustard has wide adaptability and is compatible with diverse soil and climatic conditions, making it suitable for cultivation in various Agro-climatic zones *Gupta et al. (2011)*.

Madhya Pradesh has 20% of the total dry land area in the country, and cultivating mustard under dryland conditions can be a viable alternative crop. Although indigenous mustard varieties are currently grown in the state, their productivity is significantly lower than that of hybrid mustard. By introducing hybrid mustard varieties among farmers, we can provide an alternate option over traditional cropping patterns and increase the income of small and marginal farmers. Replacing local varieties with hybrid mustard is crucial to bringing a significant increase in mustard production in the country since the productivity of hybrid mustard is 2.5 times higher than that of traditional varieties. Therefore, a scheme to popularize hybrid mustard was launched in 2018-2019 under RKVY to promote cultivation and adoption of hybrid mustard.

As per the Terms of Reference and other relevant information (*Scheme Documents*) shared by Department, the Department of Farmers Welfare and Agriculture Development under RKVY-Raftaar 2018-19 has proposed a plan to conduct demonstrations of hybrid mustard in approximately 50,000 hectares of land. The objective of this plan is to increase awareness about the benefits of using hybrid mustard seeds and to encourage farmers to adopt this technology in agriculture. Under this plan, each farmer will be allowed a maximum of one hectare of demonstration i.e., 50,000 farmers shall be benefited by conducting 50,000 demonstrations. The cost of the demonstration for one hectare of hybrid mustard will be Rs. 2,000 per farmer, which will cover the cost of the mustard seed (4 kg) seed or a maximum of Rs. 2,000 per demonstration for one hectare (4 kg per ha) area per farmer.

This scheme was implemented in the year 2018-19 in Madhya Pradesh, particularly in 10 districts (Mandsaur, Neemuch, Morena, Sheopur, Bhind, Gwalior, Shivpuri, Guna, Datia, and Ashok-Nagar) that are known for mustard cultivation. The aim was to benefit farmers of mustard crops in these sown-prone areas.

The demonstrations of hybrid mustard will help farmers to understand the benefits of using hybrid seeds, such as improved disease resistance, increased tolerance to environmental stresses, and higher yields. By demonstrating the use of hybrid mustard seeds, farmers can also learn about the best practices for cultivation, including irrigation, pest management, and fertilizer application. Overall, this plan is a significant step towards increasing the adoption of hybrid mustard seeds among farmers in Madhya Pradesh. It will not only help improve the efficiency and effectiveness of crop yield but also contribute to the growth of the agricultural sector in the state.¹

2.1 Provisions of Demonstration

Both ATMA (Agricultural Technology Management Agency) schemes and ICAR (Indian Council of Agricultural Research) recommend the provision of demonstrations to farmers as an effective way to promote and disseminate new agricultural technologies and practices. Demonstrations are practical sessions conducted in farmers' fields to showcase the benefits of new technologies or practices. The ATMA scheme promotes the conduct of demonstrations on farmers' fields to showcase new and improved technologies, including high-yielding crop varieties, pest management techniques, and farm machinery. Through the demonstrations, farmers can see the benefits of these technologies first-hand and adopt them on their farms. Similarly, ICAR also emphasizes the importance of demonstrations as a tool for technology dissemination. ICAR institutes and state agricultural universities conduct on-farm demonstrations to showcase the benefits of new crop varieties, nutrient management techniques, and pest management strategies. These demonstrations aim to increase awareness among farmers and promote the adoption of new technologies.

Overall both the ATMA schemes and ICAR recognize the importance of demonstrations in promoting the adoption of new agricultural technologies and practices. By providing practical, hands-on experience to farmers, demonstrations can help bridge the gap between scientific research and on-farm implementation, leading to improved farm productivity and income.

The farmers in a specific representative area will also conduct crop-cutting experiments so that the yield can be assessed.

¹ Source: Scheme Document RKVY-2018

The objectives of the study are as follows: -

1. To assess the impact of the demonstration of the Hybrid Mustard seed on the target beneficiaries with an aim to access the overall productivity and acceptability of the final product.
2. To access the uptake of hybrid mustard by farmers post the demonstration and whether there has been improvement in the production owing to the adoption.
3. To identify the challenges in the implementation and make recommendations accordingly.

Chapter 3: Research Methodology

The primary objective of this impact evaluation study is to assess the overall impact of the Hybrid Mustard variety Coral 432 (PAC 432) distributed for demonstration scheme on the beneficiaries in Madhya Pradesh (MP). The evaluation aims to determine the effectiveness of the scheme in improving farmers' income generation and other relevant factors. Ideally, an accurate counterfactual assessment would involve comparing pre-demonstration (ex-ante) and post-demonstration (ex-post) data on the target population. However, due to the unavailability of baseline information before the demonstration, this study adopts a comparative approach by analysing beneficiary data on the cultivation of Hybrid Mustard and Common Mustard under similar conditions.

3.1 Literature review

To ensure a comprehensive understanding of the research question, a literature review was undertaken to identify pertinent articles and research papers. The primary focus of this review was on the cultivation and production aspects of mustard seeds, with a specific emphasis on the comparison between common mustard and hybrid mustard seeds. The literature review aimed to gather existing knowledge and insights regarding the cultivation practices and production outcomes of both common and hybrid mustard seeds. This involved exploring studies that have examined the characteristics, agronomic requirements, and cultivation techniques specific to each type of mustard seed.

3.2 Sampling Plan:

A standard sampling technique was employed to select the sample districts, considering the prevalence of mustard cultivation and the availability of relevant data from the department. Particular emphasis was placed on ensuring representation from both the Bundelkhand and Malwa regions. Within each chosen district, specific blocks were identified, with a priority given to those where the department had successfully conducted demonstrations of Hybrid Mustard seeds, and where farmers had benefited from the scheme.

The data from the department shows that the proposed target for area covered is 50,000 hectares, with a total of 50,000 beneficiaries. The project will also involve 12,500 hybrid mustard seed demonstration plots, with a total quantity of 2000 quintals of seed. The total cost of the seed is estimated to be 1000 lakhs, with a total subsidy of 2000 lakhs ²

² Source: DPR-Scheme Document

3.3 Beneficiary Interviews

A total of 380 beneficiaries from the selected blocks were interviewed to assess the impact of the Hybrid Mustard seed demonstration on their income generation. The beneficiaries were chosen based on their participation in the scheme and their successful adoption of Hybrid Mustard seeds. These interviews aimed to gather first-hand information on the benefits and challenges faced by the beneficiaries as a result of adopting the new seeds.

3.4 Stakeholder Interviews

Apart from farmer beneficiary interviews, key stakeholders involved in the implementation and monitoring of the Hybrid Mustard seed demonstration scheme were also interviewed. These stakeholders included government officials, Krishak Mitras, extension workers, and representatives from local villages. Their insights were crucial in understanding the scheme's effectiveness, challenges faced during implementation, and the overall impact on the Mustard farming community.

3.5 Data Collection and Analysis

Primary Data was collected from beneficiaries as well as stakeholder interviews, were collected using structured questionnaires and open-ended interviews. The data were analysed using appropriate statistical methods to determine the impact of the Hybrid Mustard seed demonstration on farmers' income generation.

3.6 Limitations The study may have certain limitations, such as potential recall bias from interviewees and the influence of external factors beyond the scheme's control. Efforts were made to mitigate these limitations through careful sample selection and statistical analysis.

3.7 Ethical Considerations

Ethical guidelines were followed throughout the study, ensuring informed consent from all participants. Confidentiality and anonymity were maintained to protect the privacy of the respondents.

3.8 Sampling Framework

The sampling framework is tabulated in table 1 below;

S.No	Particulars	Sample Size	Total Sample	Selection Criteria
1	District	04	04 districts	Different Agro Climatic Zone of States
2	Blocks	02 from each District	08 blocks	Blocks where Field officers have themselves facilitated Demonstration among the farmers in 2018-19
3	Beneficiary Villages	02 from each block	16 Villages	Villages with maximum number of farmers being involved in Cultivation of Mustard from more than 10 years
4	Beneficiary Farmers	24 from each village	380 farmers	Randomly selected from the list of beneficiaries
5	Total Sample Farmers Interviewed	16 Villages	380	Beneficiaries from the sampled districts

Table 1 Sampling Framework in all the Districts

3.9 Information of the Sampled Blocks and Villages

The study was conducted in four sampled districts: Mandsaur, Neemuch, Ashoknagar, and Shivpuri. From these districts, a total of 8 blocks were selected for the study, as listed in the table below.

S.No	Name of District	Blocks Covered	Villages Covered	Agro-Climatic Zone
1	Mandsaur	Mandsaur	Dhamnar & Pipalya Karadiya	Bundelkhand
		Malhargarh	Billod & Napakheda	
2	Neemuch	Neemuch	Bhadbadia & Jaisinghpura	
		Jawed	Suwakheda & Juni Bawal	
3	Ashoknagar	Ashoknagar	Seji & Shadora Pawai	Malwa
		Chanderi	Naronchak & Sarsela	
4	Shivpuri	Shivpuri	Kanker & Satanwada Kalan	
		Kolaras	Berasia & Mohara	

Table 2 Information about Sampled blocks and villages

To assess the impact of the scheme on various attributes such as previous practices of Mustard cultivation, input usage, cost of cultivation, income generation, adaptability of the scheme, and

challenges faced during cultivation, primary data was collected from the beneficiaries and other stakeholders. Statistical analysis was performed on the collected data, and the means of different variables for the beneficiaries were compared.

Chapter 4: Data Analysis and Discussion.

4.1 Scheme Guidelines Compliance, Challenges about Hybrid Mustard.

The scheme has been launched to increase the awareness of hybrid mustard and promote its production and productivity. In order to bridge the knowledge gap in agriculture, Rural Agriculture Extension Officers, Agricultural Development officers, and Senior Agricultural Development Officers organized demonstrations across the districts. These demonstrations were held in various sample districts, with the majority of them (75%) being supervised by Rural Agriculture Extension Officers. The purpose of these demonstrations was likely to provide practical knowledge and training to farmers in order to improve their agricultural practices and increase their yields. This type of extension work is an important aspect of agricultural development and can lead to improvements in food security and livelihoods in rural areas.

4.2 Dissemination of Scheme Information and Awareness about Hybrid Mustard

It was reported by the department officials that dissemination of information about the Hybrid Mustard scheme was primarily done through meetings and door-to-door interactions by the Krishak Mitra at the village level. While banners and posters were also used, they were only reported by 20% of officials. The block level agriculture office with support from the village level panchayat was responsible for the dissemination of the information. Furthermore, the majority of the beneficiaries in all the sampled districts were aware of the advantages of growing hybrid mustard over traditional varieties, and few were cultivating hybrid mustard even without receiving seeds under the scheme from the department. This suggests that there may be a high demand for hybrid mustard in these districts.

4.3 General Profile of the Beneficiaries.

4.3.1 Category of Beneficiaries

The study's sampled beneficiaries were categorized into different groups based on their social background. The distribution of beneficiaries across each category in all the sampled districts is as follows:

1. General Category: 21% of the sampled beneficiaries belonged to the General category.



2. Other Backward Class (OBC): 62% of the sampled beneficiaries were from the Other Backward Class.

3. Scheduled Caste (SC): 12% of the sampled beneficiaries belonged to the Scheduled Caste.

4. Scheduled Tribe (ST): 5% of the sampled beneficiaries were from the Scheduled Tribe.

The distribution of beneficiaries across these categories provides insights into the representation of different social groups in the study, allowing for a more comprehensive understanding of the scheme's impact across diverse segments of the population.

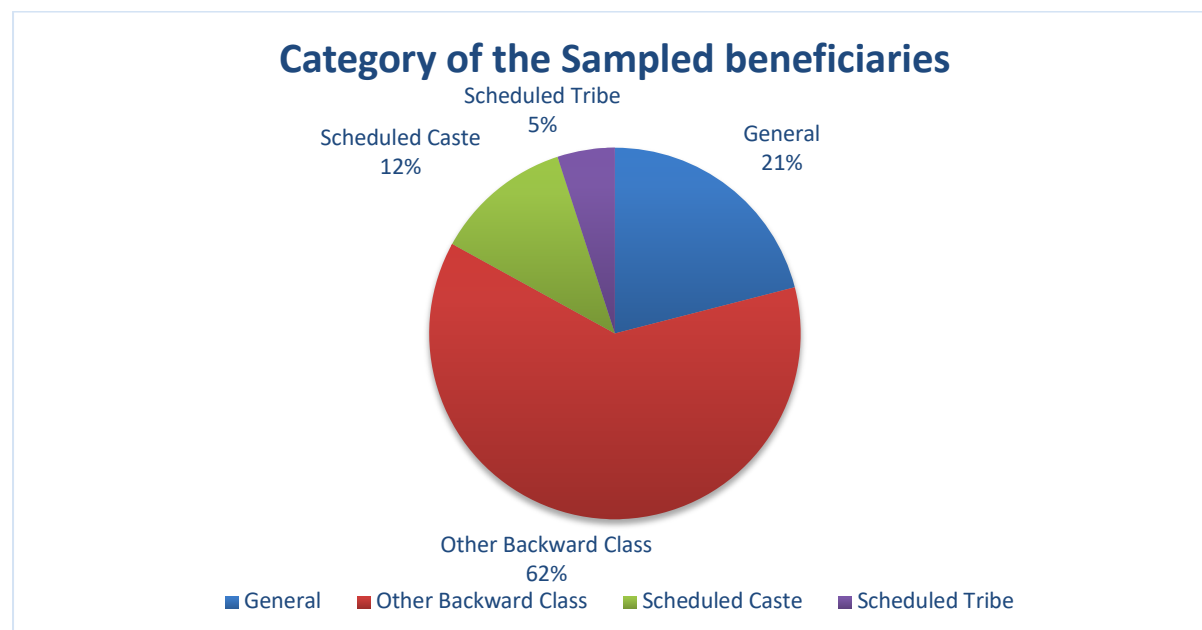


Figure 1 Category of Beneficiaries

4.3.2 Educational Background

The figure 2 presents data on the distribution of beneficiaries in the sampled districts based on the Indian Standard Classification of Education 2014. It was revealed that 14% of the farmer beneficiaries have completed their primary education. It is worth notable that an equal percentage (30%) of farmer beneficiaries have completed their upper primary education and senior secondary education, indicating a significant emphasis on education in these districts. A considerable proportion (23%) of the farmer beneficiaries have pursued higher education, which suggests a focus on skill development and knowledge enhancement within the farming community. Despite efforts to promote education, a small percentage (3%) of farmer beneficiaries are still illiterate, highlighting the need for targeted interventions to uplift and empower this group.

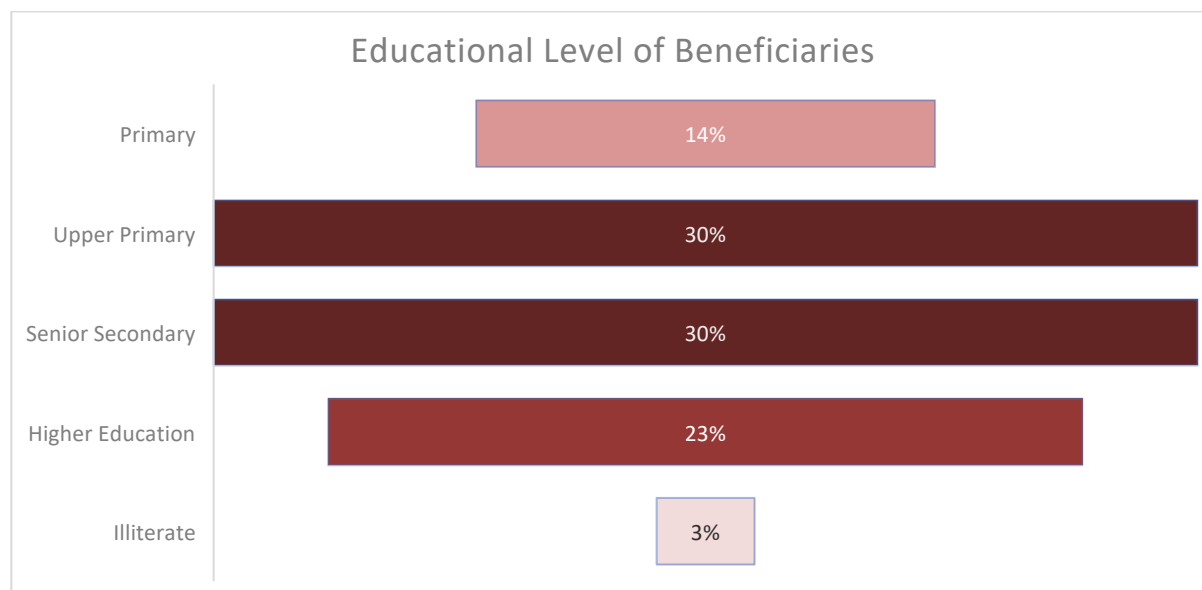


Figure 2 Educational Level of Beneficiaries

4.3.3 Occupational Status:

The figure 3 represents the percentage distribution of occupational statuses within a given population.

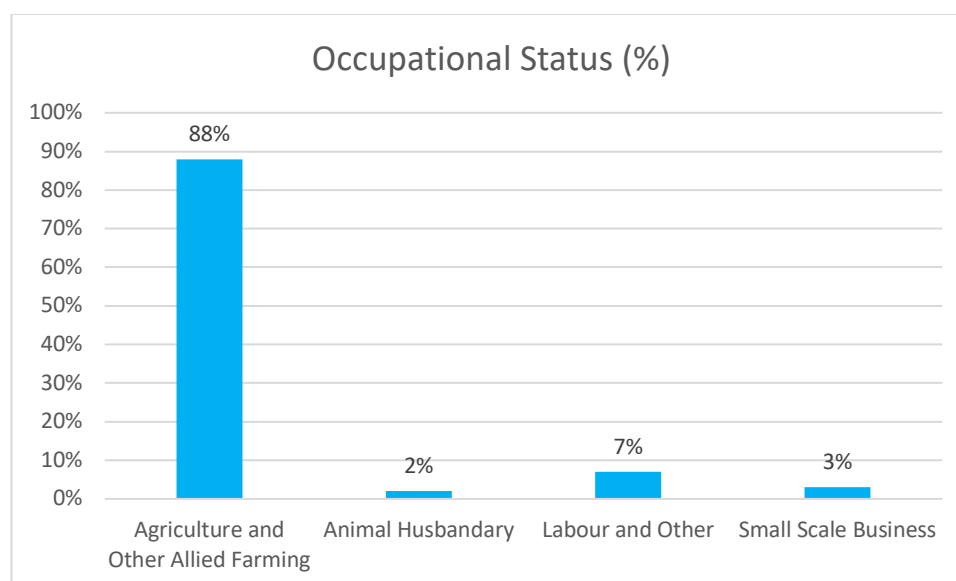


Figure 3 Occupational Status

According to the data, the vast majority of the beneficiaries (88%) are largely involved in agriculture and related farming activities. This illustrates the agricultural nature of the economy in the sampled districts, as well as the importance of farming as the primary means of income for the beneficiaries. While agriculture is the most common employment, only a small percentage (2%) of the beneficiaries engage in animal husbandry. This shows that livestock

husbandry is less common in these regions than crop production and other agricultural practises. The results also show some vocational diversity among those surveyed. Approximately 7% are involved in labour-related activities or other jobs. Furthermore, 3% own small enterprises, indicating a fair amount of entrepreneurial activity among the rural population.

4.4 Financial Status of Beneficiaries

The data from the field presents the distribution of respondents based on their financial status, categorized as Above Poverty Line, Below Poverty Line, and Unaware. The interpretation of this data in the context of census categorization is as follows:

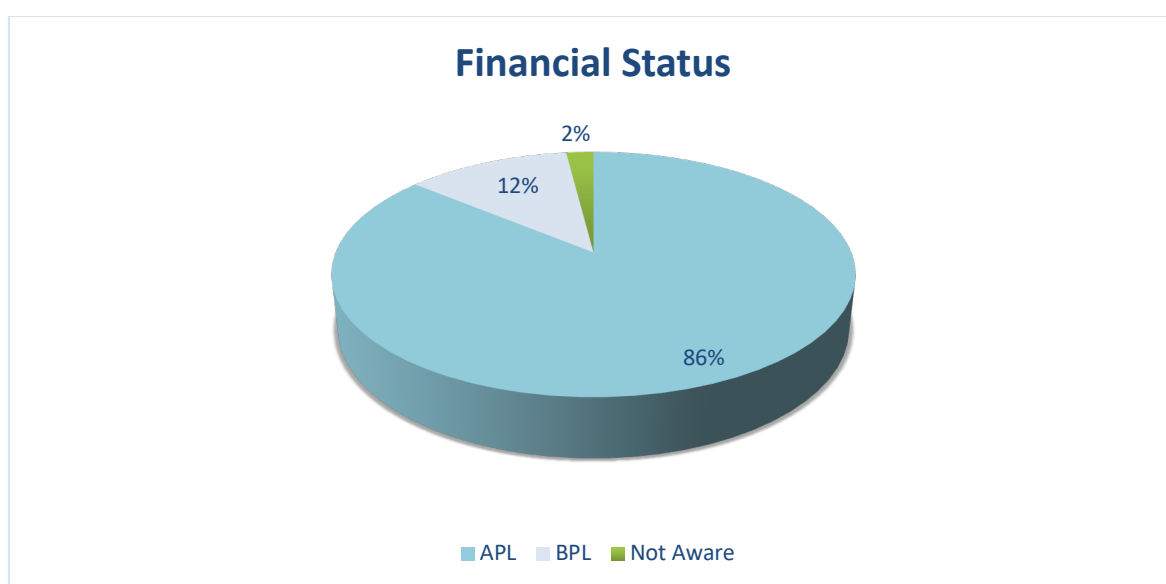


Figure 4 Financial Status

The data indicates that a large majority (86%) of the beneficiaries are above the poverty line, suggesting a relatively stable financial status. This may imply that a significant proportion of the beneficiaries have access to adequate resources to meet their basic needs. While the majority are above the poverty line, 12% of the beneficiaries are below the poverty line, indicating the presence of economically vulnerable individuals or households within the sampled districts. These beneficiaries might face financial challenges in meeting their essential needs and may require additional support and interventions. A small proportion of the target population shows that 2% of the beneficiaries were not aware of their financial status or could not provide relevant information.

4.5 Land Holding Size of the Beneficiaries

The figure 5 presents data on the categorization of farmers in the districts of Ashoknagar, Mandsaur, Neemuch, and Shivpuri, based on the Agricultural Census categorization of landholding size.

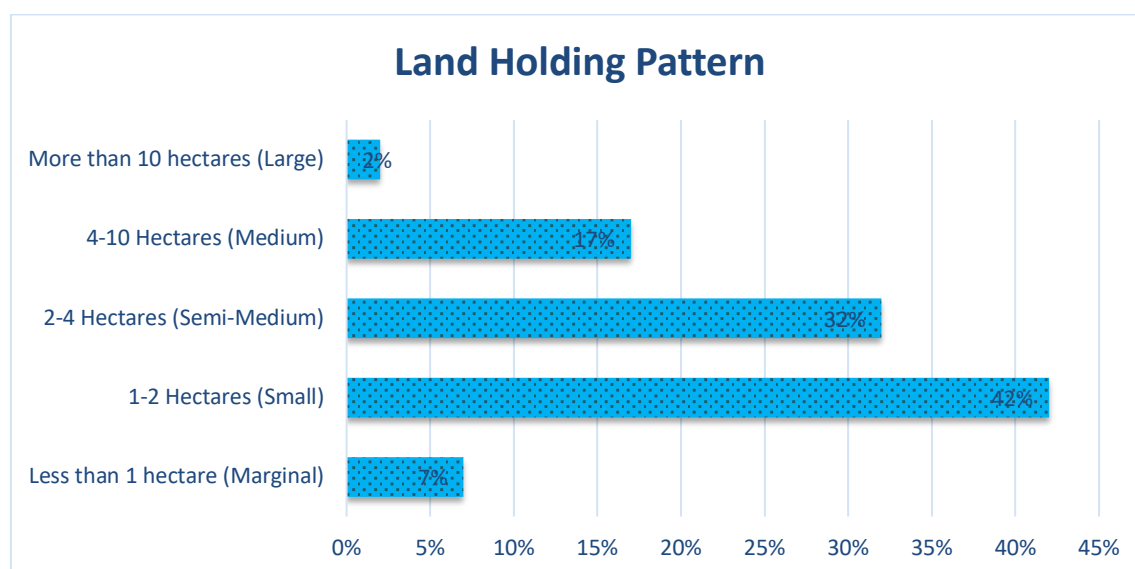


Figure 5 Land Holding Size of Beneficiaries

The data analysis indicates that a significant proportion of the beneficiaries belong to the small and semi-medium landholding categories, constituting 42% and 32% respectively. This means that a large number of beneficiaries have relatively moderate-sized agricultural land. On the other hand, a smaller percentage, specifically 7% of the beneficiaries, have marginal land holdings, which are less than 1 hectare in size. Additionally, only 2% of the beneficiaries possess large land holdings, exceeding 10 hectares. This suggests that there are fewer beneficiaries with extremely small or extremely large land sizes.

Interestingly, the data also reveals the presence of medium-scale farmers, accounting for 17% of the beneficiaries. This category comprises farmers with land holdings ranging from 4 to 10 hectares.

4.6 Income from Primary Source

The data collected from the field for the study represents the annual average income from the primary source of the sampled beneficiaries, which primarily includes income from agriculture and allied farming activities across all the sampled districts. The income is categorized into four ranges as shown in fig 6.

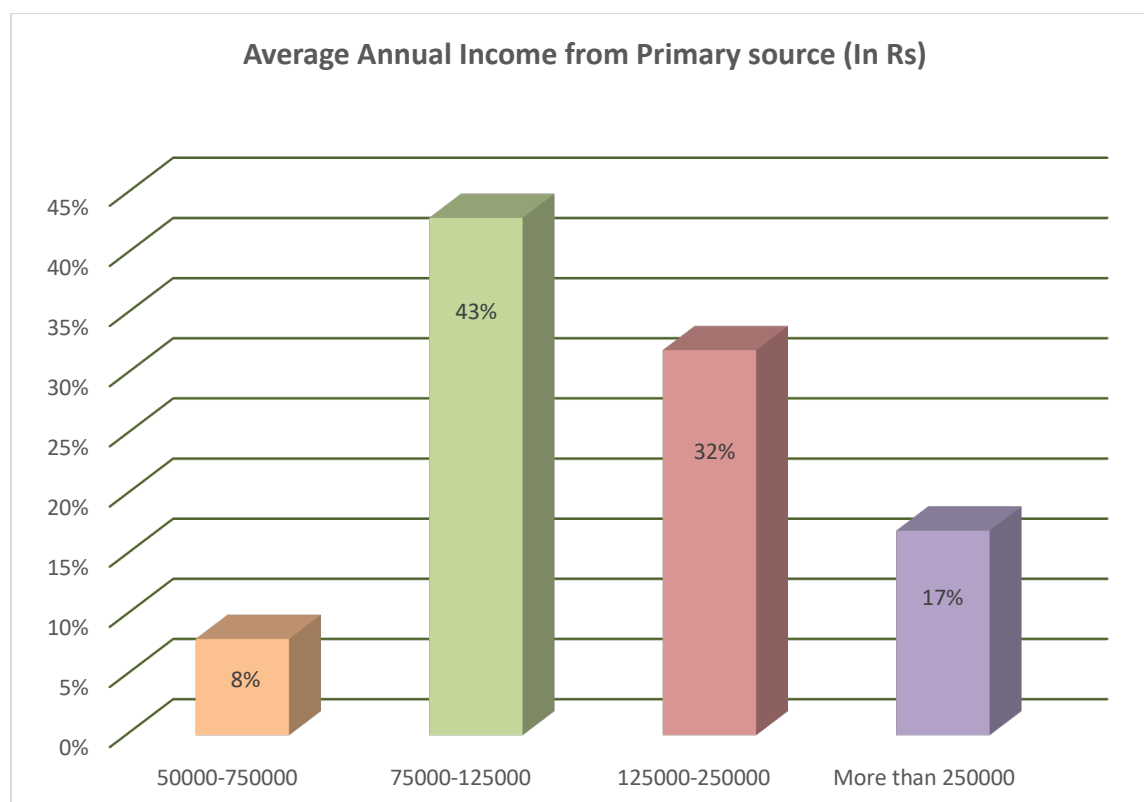


Figure 6 Average Annual Income from Primary source (In Rs)

It was revealed that 8% of the beneficiaries have an annual average income falling in the range of (50000-75000 Rupees). The majority, 43% of the beneficiaries, have an annual average income between 75,000 to 125,000 rupees. A significant 32% of the beneficiaries fall within the range of 125,000 to 250,000 rupees. Additionally 17% of the beneficiaries fall in the range of More than 250,000.

The data reveals a diverse income distribution among the sampled beneficiaries indicating a considerable portion of the farming community with moderate income levels. The income distribution data provides insights into the economic impact of the primary source of income, i.e., agriculture and allied farming activities indicates the potential for agriculture to provide substantial economic returns under successful farming practices.

4.7 Engagement in Primary Source of Income

The beneficiaries were asked about their engagement in the primary source of Income and we can interpret that the engagement of beneficiaries in their primary source of income varies across sampled districts. The data indicates that the majority of the beneficiaries (83%) are engaged in farming for a substantial period of time, which ranges from 6 to 9 months in a year.

This suggests that farming is a primary and significant source of livelihood for a large portion of the farming community in the sampled districts. A notable proportion (13%) of the beneficiaries are involved in farming throughout the year, from 9 to 12 months. This likely indicates a focus on year-round agricultural activities and diversified cropping

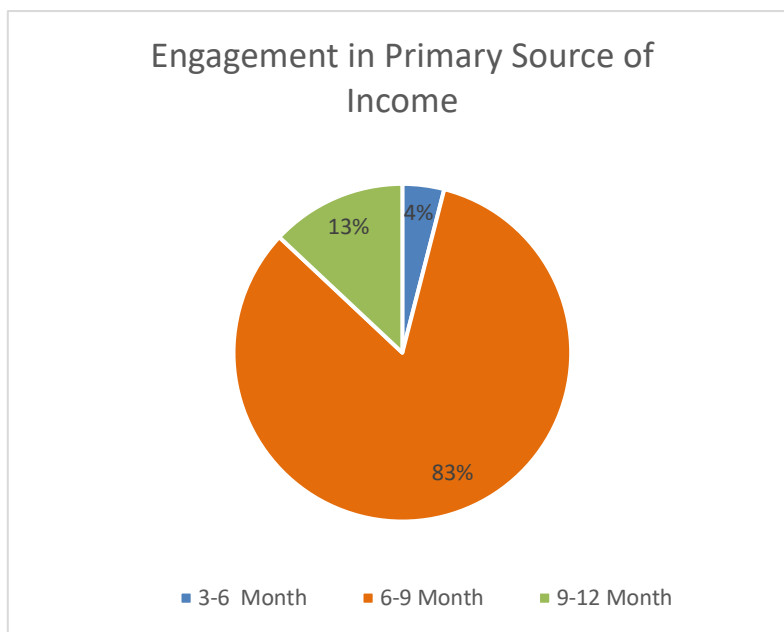


Figure 7 Engagement in Primary Source of Income

patterns to meet the needs of the farmers and generate consistent income. Only a small percentage (4%) of the beneficiaries engage in farming for a relatively shorter duration, which is between 3 to 6 months. This might be indicative of seasonal farmers who depend on specific cropping seasons or other non-farming activities during the rest of the year.

4.8 Reasons for cultivation of Common Mustard

The figure 8 highlights the significant role of economic factors in influencing mustard cultivation decisions among the beneficiaries. Low cultivation cost, higher income generation, and increasing market demand are the key economic incentives driving farmers to choose mustard as a preferred crop across all the sampled districts.

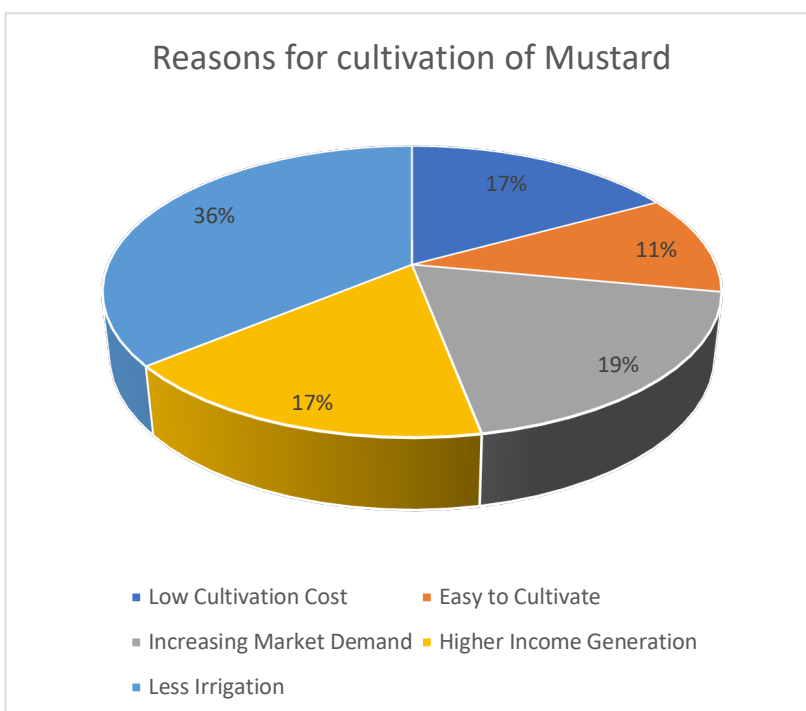


Figure 8 Reasons for cultivation of Mustard

- a) **Less Irrigation:** The majority (36%) of the beneficiaries mentioned that one of the reasons for cultivating mustard is its lower water requirements. This suggests that mustard is well-suited to the local Agro-climatic conditions, where water resources may be limited.
- b) **Low Cultivation Cost:** 17% of the beneficiaries cited low cultivation cost as a primary reason for choosing mustard cultivation. This suggests that mustard is considered a cost-effective crop to grow compared to other options.
- c) **Easy to Cultivate:** 11% of the beneficiaries mentioned ease of cultivation as a reason for opting for mustard cultivation. This indicates that mustard is perceived as a crop that requires less effort and resources during the cultivation process.
- d) **Increasing Market Demand:** 19% of the beneficiaries stated that the increasing market demand for mustard was a motivating factor for choosing this crop. This suggests that there is a growing demand for mustard in the market, potentially leading to better market prices and higher returns for the farmers.
- e) **Higher Income Generation:** 17% of the beneficiaries cited higher income generation as a reason for cultivating mustard. This indicates that farmers expect mustard cultivation to offer better income opportunities compared to other crops.

4.9 Duration of Time Involved in Mustard Cultivation

The figure 9 represents the time duration for which the sampled beneficiaries have been involved in mustard cultivation. It was observed that a substantial proportion of the sampled beneficiaries have significant experience in mustard cultivation. More than half (57%) have been growing mustard for over 10 years, indicating their long-standing engagement and

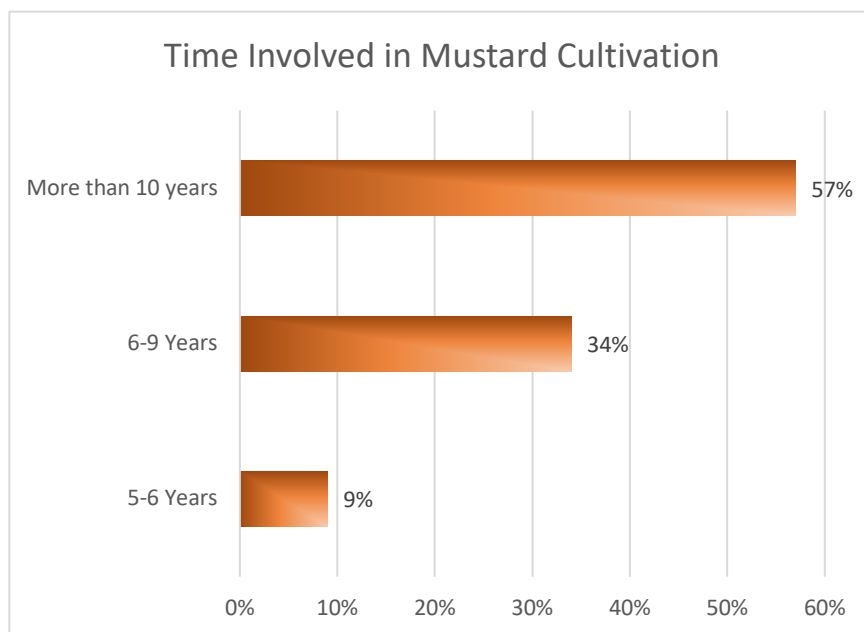


Figure 9 Duration of Time Involved in Practicing Mustard Cultivation

expertise in this crop. The substantial percentage of beneficiaries (34%) involved in mustard cultivation for 6 to 9 years indicates a considerable commitment to this crop over an extended

period. A relatively smaller percentage (9%) of beneficiaries engaged in mustard cultivation for 5 to 6 years suggests that there might be a smaller number of new entrants or recent adopters of mustard cultivation.

4.10 Area of Land used for Cultivation of Mustard Crop

The figure 10 provides information on the distribution of land area used by beneficiaries for the cultivation of Mustard crop in four different districts: Ashoknagar, Mandsaur, Neemuch, and Shivpuri.

A majority of the sampled beneficiaries (51%) have relatively small land holdings, cultivating

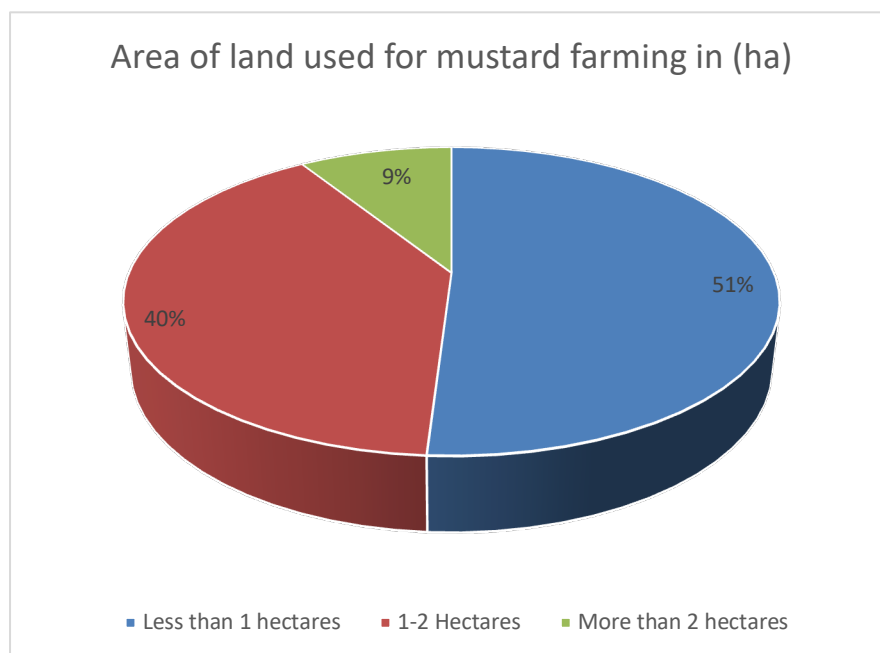


Figure 10 Area used for Cultivation of Hybrid Mustard

mustard on less than 1 hectare. This suggests that mustard is a crop that can be adapted to smaller land sizes, making it accessible to a wide range of farmers. The category of beneficiaries cultivating mustard on an area of 1 to 2 hectares accounts for 40% of the sampled beneficiaries. This indicates that a considerable number of farmers have medium-sized land holdings, allowing for a slightly larger scale of mustard cultivation. Only 9% of the beneficiaries cultivate mustard on an area larger than 2 hectares. This suggests that large-scale mustard cultivation is relatively less prevalent among the sampled farmers.

Chapter 5: Post Intervention and Implementation of the Scheme

5.1 Awareness about the Scheme

The data collected from the field indicates that there is universal awareness of the scheme among the beneficiary farmers in all four sampled districts.

S.No	Particulars	Mandsaur	Neemuch	Ashoknagar	Shivpuri
1	Awareness about the Scheme	Yes	Yes	Yes	Yes
2.	Participation in the Demonstration	Yes	Yes	Yes	Yes

Table 3 Information about Awareness of the Scheme

This high level of awareness suggests that the information dissemination and outreach efforts related to the scheme were effective and successful in reaching the target audience. Overall, the high awareness level of the scheme among the beneficiary farmers reflects the importance of effective communication and outreach strategies in the successful implementation of agricultural development programs.

5.2 Reasons for Participating in the Demonstration

The beneficiaries were asked about the reasons for participating in the demonstration of Hybrid Mustard in their field and data revealed that the majority of the farmer beneficiaries (55%) cited "additional income" as the primary reason for taking up the demonstration by cultivating the distributed variety. This aligns with the information provided by

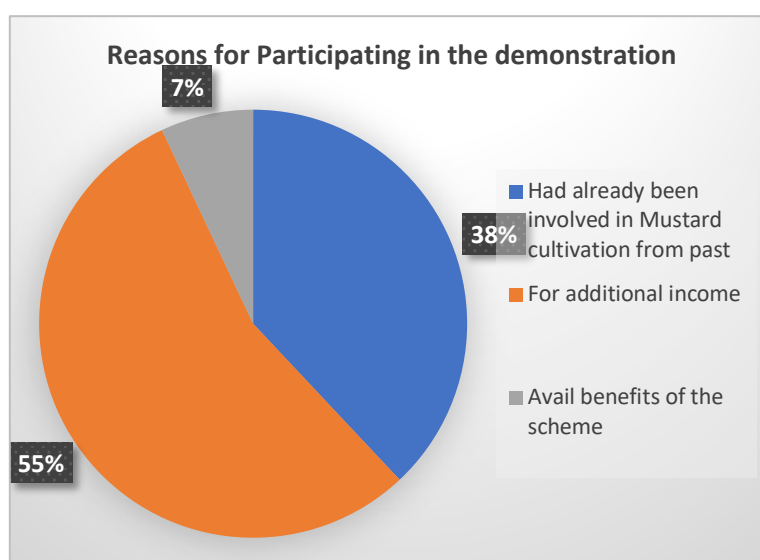


Figure 11 Reasons for participation in demonstration

the departmental representatives, who informed the farmers that this particular hybrid variety

would yield good produce and generate extra income. Furthermore, a significant portion of the respondents (38%) mentioned that they had already been involved in mustard cultivation in the past. This suggests that they recognized the potential benefits of mustard cultivation and were eager to explore the opportunities presented by the hybrid variety. A smaller proportion of respondents (7%) revealed that they were motivated to participate in the demonstration to avail the benefits of obtaining hybrid seeds for free of cost. This indicates that the availability of free hybrid seeds served as an incentive for some farmers to try out the new variety.

5.3 Activities during the demonstration

An Interview with the concerned stakeholders was conducted in the sampled districts and respondents were asked about the demonstration activities conducted by the Department and it was observed that following activities were conducted in all the sampled districts

- a) **Distribution of Hybrid Mustard Seeds:** The name of the hybrid seed distributed in all the sampled districts is Coral 432 (PAC 432). This hybrid seed has a cultivation cycle of 121-132 days. It possesses several special attributes, including being a hybrid variety, resistant to white rust disease, and having an average plant height of 180-190 centimetres. The average yield potential of this hybrid seed is reported to be in the range of 18-25 quintals per hectare. Moreover, it is highly recommended for cultivation in both rainfed and irrigated areas, indicating its adaptability to varying Agro-climatic conditions in the state. Each beneficiary was provided with 4 kilograms of Hybrid Mustard seed for cultivation. The distribution of hybrid seeds aimed to encourage the farmers to try the new variety and experience its potential benefits.
- b) **Training on Modern Farming Techniques:** The beneficiaries received training on modern and improved farming techniques. These training sessions were conducted at the block level by Krishi Vigyan Kendra (KVK), which is an agricultural extension center that provides technical knowledge and expertise to farmers. The training aimed to educate the farmers about best practices, efficient farming methods, and the proper utilization of resources to enhance agricultural productivity. The training sessions were facilitated by field officers such as (SADO/RAEO). These officers played a crucial role in guiding and assisting the farmers during the demonstration, offering expert advice, and answering their queries.
- c) **Information about the Benefits of Hybrid Mustard:** The farmers were informed about the numerous benefits of cultivating the demonstrated Hybrid Mustard variety. These benefits might include higher yield potential, resistance to pests and diseases, better adaptability to

local conditions, and improved market value. This information was intended to motivate the farmers to adopt the hybrid variety and witness the positive outcomes of its cultivation.

5.4 Average Cost of Cultivation of Mustard Crop

The figure represents the average cost of cultivation per hectare of the Mustard crop cultivated in the sampled districts, as reported during the Focus Group Discussions (FGD) with farmer groups. The cost of cultivation is categorized into three ranges for each district, and the percentages of farmers falling within each range as shown;

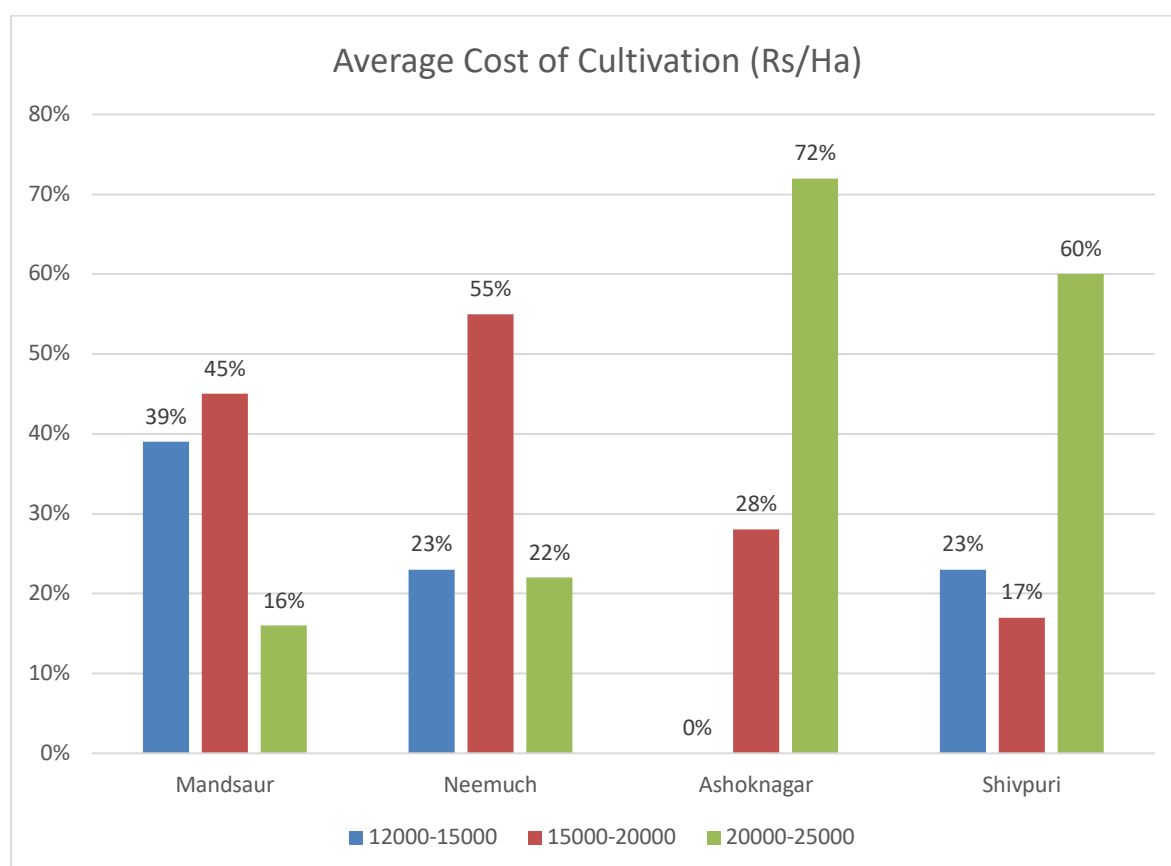


Figure 12 Average Cost of Cultivation (Rs/ha)

The average cost of cultivation of Mustard crop varied among the sampled districts. In Mandsaur, 39% of the farmers reported an average cost falling within 12,000 to 15,000 rupees, while 45% stated the cost ranged from 15,000 to 20,000 rupees, and 16% reported it to be between 20,000 to 25,000 rupees. Neemuch had 23% of farmers with costs ranging from 12,000 to 15,000 rupees, 55% with costs between 15,000 to 20,000 rupees, and 22% with costs between 20,000 to 25,000 rupees. In Ashoknagar, none reported costs in the 12,000 to 15,000 rupees range, 28% had costs between 15,000 to 20,000 rupees, and a significant 72% reported costs from 20,000 to 25,000 rupees. In Shivpuri, 23% of farmers had costs from 12,000 to

15,000 rupees, 17% with costs from 15,000 to 20,000 rupees, and 60% with costs between 20,000 to 25,000 rupees.

The Highest Cost in Ashoknagar and Shivpuri districts highlights that these districts have specific factors influencing the cost of cultivation, such as the adoption of modern farming techniques, input usage, pest and disease management practices, and transportation costs to the local market or mandi.

5.5 Average Production of Common Mustard before and after Demonstration

The table provides data on the average production of Common Mustard (cultivated using certified seeds) and Hybrid Mustard variety (specifically, Coral-432) distributed during the demonstration in the sampled districts.

Average Production of Common Mustard and Hybrid Mustard after Demonstration (Q/ha)		
Sample Districts	Common Mustard (Certified)	Hybrid Mustard (Coral-432)
Mandsaur	15-17	18-22
Neemuch	14-16	16-22
Ashoknagar	14-18	18-22
Shivpuri	14-16	18-22

Table 4 Average Production Common vs Hybrid Mustard

In Mandsaur, the average production of Hybrid Mustard (Coral-432) ranged from 18 to 22 quintals per hectare, whereas the average production of Common Mustard (certified seed) ranged from 15 to 17 quintals per hectare. In Neemuch, the average production of Hybrid Mustard (Coral-432) ranged from 16 to 22 quintals per hectare, while the average production of Common Mustard (certified seed) ranged from 14 to 16 quintals per hectare. Similarly, in Ashoknagar, the average production of Hybrid Mustard (Coral-432) ranged from 18 to 22 quintals per hectare, and the average production of Common Mustard (certified seed) ranged from 14 to 18 quintals per hectare. In Shivpuri, the average production of Hybrid Mustard (Coral-432) ranged from 18 to 22 quintals per hectare, while the average production of Common Mustard (certified seed) ranged from 14 to 16 quintals per hectare. These results indicate that the cultivation of Hybrid Mustard (Coral-432) led to notable improvements in average production compared to Common Mustard (certified seed) across all the sampled districts.

5.6 Average Income generated after demonstration of Hybrid Mustard

Based on the primary data collected from the field in all the sampled districts, a cost-benefit analysis has been conducted to assess the income generated per quintal of Hybrid Mustard (Coral-432) compared to Common Mustard (certified seed). Since the average cost of cultivation for both mustard crop varieties has been reported to be equal at 25,000 rupees per hectare, and the input cost of cultivation has been assumed on the higher range, we can analyse the potential income benefits of cultivating Hybrid Mustard.

S.No	Particulars	Mandsaur	Neemuch	Ashoknagar	Shivpuri
1	Average Production Hybrid Mustard (q/ha)	18-22	16-22	18-22	18-22
2	Average cost of cultivation (per hectare)	25000	25000	25000	25000
3	Average selling price (per quintal in Rupees)	4600	5000	5200	4800
4.	Average productivity (q/ha)	20	19	20	20
5	Average Profit per (Rs/ha)	67000	75000	79,000	71,000

Table 5 Average income of beneficiaries (Pre & Post)

The table 5 shows the average production, cost of cultivation, selling price, productivity, and profit per hectare for four districts in Madhya Pradesh.

Mandsaur has the highest average profit per hectare, followed by Neemuch, Ashoknagar, and Shivpuri. This study found that farmers in Mandsaur were able to generate the most profit from Hybrid Mustard cultivation. The average productivity of Hybrid Mustard in all four districts is 20 quintals per hectare. This is a good yield, and it was found that the demonstration of Hybrid Mustard was successful in increasing productivity. The average cost of cultivation per hectare is 25,000 rupees, which is a reasonable cost as compared to the other crops, and did not significantly increase the input cost of cultivation of farmers. The average selling price per quintal of Hybrid Mustard crop was found to help farmers get a fair price for their crops.

Additionally it was found that on average, cultivating Hybrid Mustard (Coral-432) has yielded a higher profit per hectare compared to Common Mustard (certified seed) in all the sampled districts. This outcome supports the positive impact of the Hybrid Mustard seed

distribution scheme on farmers' economic well-being and serves as a significant insight for future agricultural development strategies.

5.5 Adoption of Hybrid Mustard Variety for Cultivation

In the realm of agricultural research and development, the choice of seeds holds paramount importance as it directly influences crop productivity, farmer income, and overall agricultural sustainability. A critical decision faced by farmers is whether to adopt hybrid seeds or continue with traditional market-certified seeds for cultivation. This decision is central to the effectiveness of various agricultural interventions and can significantly impact the livelihoods of farmers. In the context of our study, we delve into the questions surrounding the subsequent choice between cultivating hybrid seeds and market-certified seeds.

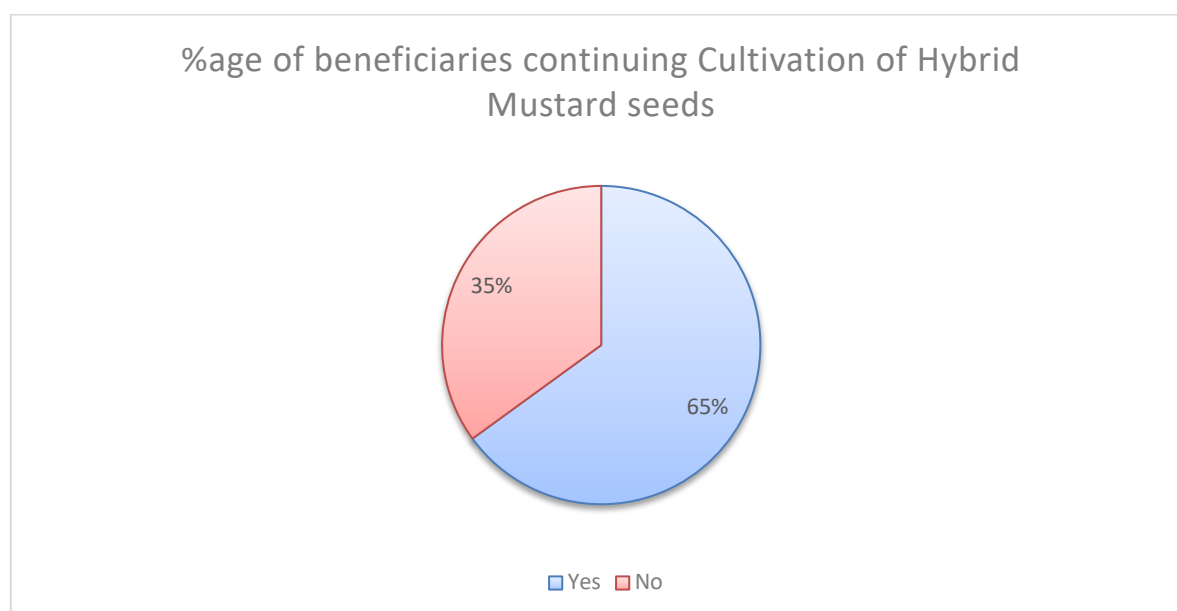


Table 6 Farmer Beneficiaries continuing Hybrid mustard seeds

The data collected from interviews with farmer beneficiaries in the sampled districts provides valuable insights into the post-demonstration cultivation of Hybrid Mustard seeds. The revealed percentages and the associated reasons shed light on the complexities and considerations that influence farmers' decisions regarding seed choice and cultivation practices. These findings hold significance in understanding the practical implications of seed adoption and its impact on productivity and income generation.

Among the farmer beneficiaries, a notable 65% continued the cultivation of Hybrid Mustard seeds after the demonstration. This can be attributed to their reported increase in overall productivity and income generation. The adoption of hybrid seeds is often associated

with improved crop traits and performance, which resonates with the positive outcomes reported by this majority group. Interestingly, within the 65% of beneficiaries who continued cultivation, a significant portion highlighted the unavailability of the demonstrated variety Coral-PAC-432 after the initial demonstration in 2018-19. Instead, they turned to the readily available newer Hybrid variety Pioneer 45S-46, accessible through the National Seeds Corporation (NSC) or local markets. This trend underscores the importance of seed availability and accessibility in influencing farmers' choices. The shift to an alternative variety showcases farmers' adaptability and willingness to experiment with other options to sustain their cultivation efforts.

On the other hand, 35% of the beneficiaries chose not to continue cultivation of Hybrid Mustard seeds. This group cited several challenges that deterred them from persisting with hybrid varieties. Notably, the timely availability of seeds emerged as a crucial factor. Late availability (After mid-September) impacted the germination process, rendering the crops susceptible to white rust and affecting plant height and subsequent production. This underscores the importance of timely seed availability to optimize planting conditions and mitigate disease risks. Furthermore, the consideration of cost played a role for this group. Some beneficiaries noted the preference for local market-based certified seeds or hybrid seeds, depending on availability and cost-effectiveness. This suggests that affordability and economic considerations influence seed choices, particularly when faced with challenges like late availability.

A subset of beneficiaries who initially used Hybrid Seeds Coral-PAC-432 provided by the department reported a decrease in yield after one year, indicating potential challenges related to seed quality and performance over time. This highlights the need for consistent seed quality assurance and support mechanisms to ensure sustained benefits for farmers.

5.6 Change in the Area of Cultivation after Demonstration

The data gathered from the interviews with farmer beneficiaries in the sampled districts sheds light on the changes in cultivation area following the demonstration of Hybrid Mustard seeds. The provided percentages highlight the varying responses of farmers regarding adjustments in their cultivation practices in response to the demonstrated hybrid variety, Coral-PAC-432.

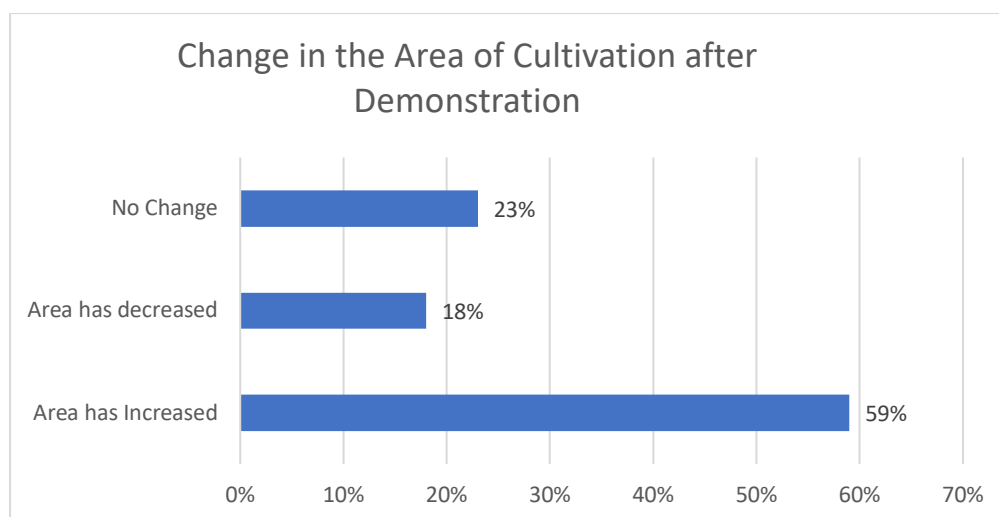


Figure 13 Change in the Area of cultivation after demonstration

Among the surveyed farmer beneficiaries, a substantial 59% reported an increase in their cultivation area after the demonstration of Hybrid Mustard. This increase can be indicative of the positive impact and outcomes experienced by these farmers, likely resulting from the perceived benefits of cultivating the hybrid variety. The reported expansion of cultivation area underscores the farmers' confidence in the Hybrid Mustard's performance and its potential to contribute to enhanced productivity and income generation. Conversely, 18% of the respondents stated that their cultivation area had decreased following the demonstration. This reduction reflected factors such as land constraints, crop rotation strategies, or challenges encountered during the cultivation of the hybrid variety. It is important to note that the decrease in cultivation area does not necessarily reflect a negative perception of the hybrid seeds; rather, it could be attributed to various contextual and individual factors specific to each farmer.

Additionally, 23% of the surveyed farmers reported no change in their cultivation area after the demonstration. This group may have chosen to maintain their existing cultivation practices, potentially due to factors such as crop diversification strategies, limited availability of hybrid seeds, or adherence to traditional farming practices. The decision to maintain the status quo indicates a complex interplay of factors that influence farmers' choices and decisions.

Chapter 6: Challenges in Cultivation and Adoption of Hybrid Mustard seeds.

6.1 Mustard's (Pest Infestation) as Major Challenge

The data underscores the diversity of challenges with respect to Infestation faced by farmers in the sampled districts. The figure 14 enlists several menaces that are the primary concerns, demanding urgent and region-specific interventions.

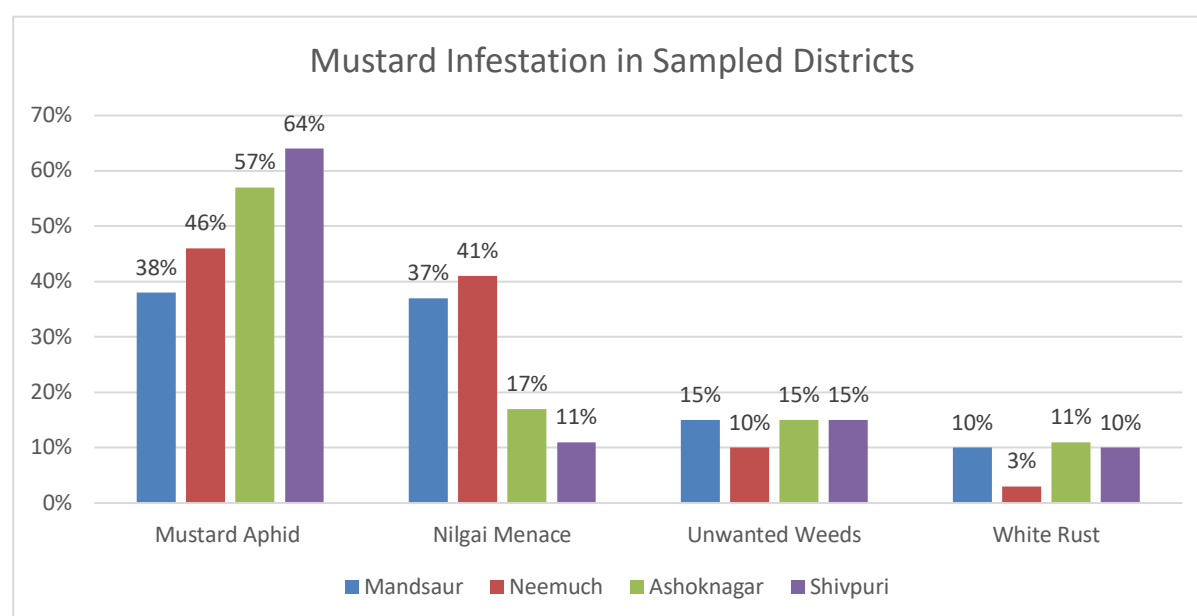


Figure 14 Mustard Infestation in sampled districts

Mustard Aphid: The infestation of Mustard Aphid is a widespread concern across all four districts. Notably, the infestation is particularly high in Shivpuri (64%) and Ashoknagar (57%), indicating a significant threat to mustard crops in these regions. This emphasizes the urgency of implementing effective pest management strategies to control the aphid population and minimize crop damage.

Nilgai Menace: The issue of Nilgai menace is prominent in Mandsaur, Neemuch, and to a lesser extent in Ashoknagar. In Mandsaur and Neemuch, nearly 40% of respondents are affected by this menace, indicating the severity of crop destruction caused by Nilgai. The issue seems to be relatively less pronounced in Ashoknagar (17%) and Shivpuri (11%), suggesting that these districts might have some measures in place to mitigate Nilgai-related damage.

Unwanted Weeds: A moderate proportion of respondents across the districts (ranging from 10% to 15%) cited unwanted Weeds (*Orobancha aegyptiaca*) as a challenge. This suggests that unpredictable weather patterns, such as unseasonal rainfall, can impact crop growth and

development. Timely agricultural practices and suitable crop varieties could be explored to mitigate the risks associated with weeds.

White Rust: White Rust infestation is relatively low in Neemuch (3%) but higher in Mandsaur (10%), Ashoknagar (11%), and Shivpuri (10%). Although not the most prevalent issue, it still poses a threat to mustard crops in these districts. Farmers might benefit from training and guidance on disease management strategies to address white rust and reduce its impact.

6.2 Reasons for Challenges faced by Farmers Post Demonstration

The possible reasons for the challenges faced by farmers in cultivating Hybrid Mustard (Coral-432) following the demonstration are reflected in the responses provided by the beneficiaries in the sampled districts. These reasons encompass a range of concerns, including seed availability, seed quality, pest resistance, plant characteristics, and access to essential agricultural inputs.

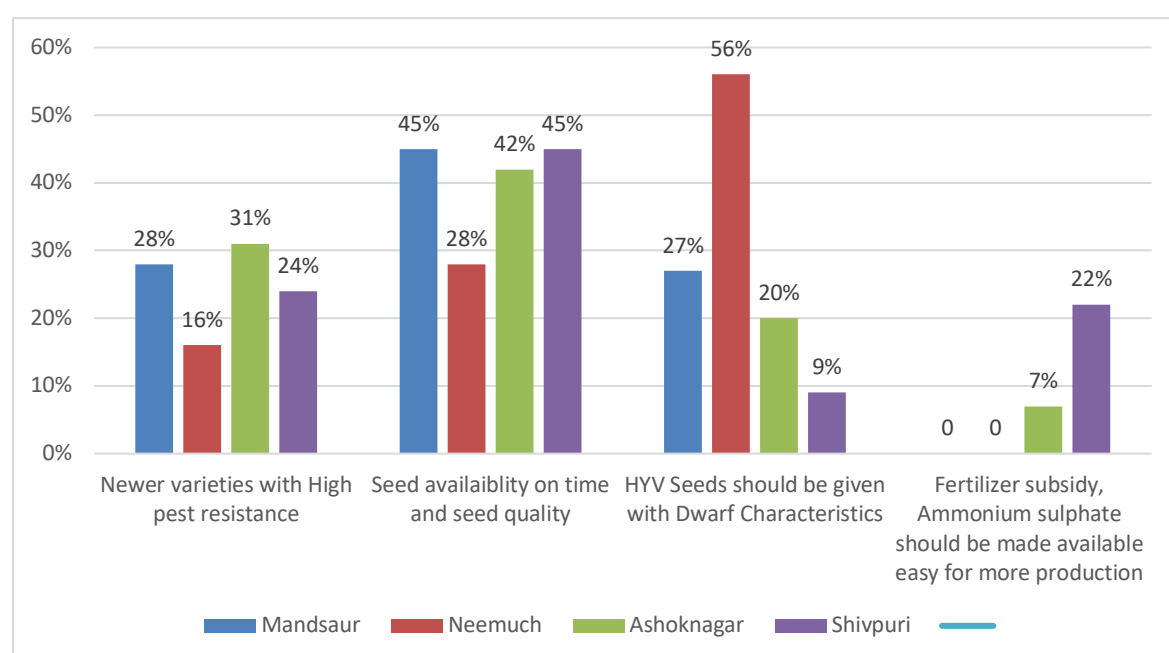


Table 7 Challenges faced by farmers after demonstration

Challenge 1: Newer Varieties with High Pest Resistance

A notable percentage of farmers across all sampled districts (ranging from 16% to 31%) expressed the challenge of accessing newer hybrid varieties with high pest resistance. This highlights the need for improved access to advanced hybrid seeds that offer increased pest resistance, thereby contributing to enhanced crop protection and productivity.

Challenge 2: Seed Availability on Time and Seed Quality

Seed availability emerged as a significant challenge for farmers, with the majority of respondents in each district (ranging from 28% to 45%) emphasizing the importance of timely access to seeds. The quality of seeds was also a concern, with farmers emphasizing the need for seeds that meet high quality standards. This underscores the critical role of seed distribution systems in ensuring successful hybrid mustard cultivation.

Challenge 3: HYV Seeds with Dwarf Characteristics

Respondents in Neemuch district stood out with 56% expressing the challenge of accessing high-yielding variety (HYV) seeds with dwarf characteristics. This preference for dwarf varieties reflects a desire for crops that are more suitable for local conditions and easier to manage. The varying percentages across districts suggest the contextual nature of this challenge.

Challenge 4: Fertilizer Subsidy and Availability of Ammonium Sulphate

Farmers in Ashoknagar (7%) and Shivpuri (22%) districts cited the challenge of accessing fertilizer subsidy, particularly for ammonium sulphate. This pointed a need for streamlined subsidy mechanisms and improved availability of specific fertilizers to support increased crop production.

6.3 Other Environmental Factors

1. Destructing Mustard Crop by Mustard Aphid and Impact on Expected Hybrid Variety Yield

Mustard Aphid (*Lipaphis erysimi* Kalt) is a notorious pest that poses a significant threat to mustard crops, often leading to reduced production and yield. Mustard aphid infestations can lead to reduced crop yields due to rapid population growth, resistance to insecticides, inadequate monitoring, and unfavourable climate conditions. Poor cultural practices and hybrid variety vulnerabilities also contribute. Viral transmission worsens damage, impacting growth and productivity of plants, emphasizing the need for effective pest management strategies.



Source: 1 agricultureandagricultureinformation.blogspot.com

Research supports the detrimental impact of mustard aphids on crop yield and quality. Studies have documented the feeding behavior of aphids, leading to chlorosis, curling, and distortion of leaves, ultimately affecting photosynthesis and yield (*Singh et al. 2000*). Additionally, aphids are known to transmit viral diseases that compromise crop health and productivity (*Singh et.al 2015*). Effective aphid management practices, including the use of resistant varieties, cultural practices, biological control agents, and targeted chemical interventions, have been proposed to mitigate aphid-induced yield losses *Gautam et.al (2019)*.

2. Impact of Nilgai on Mustard Crop: Long Plant Height as a Destructive Factor

Nilgai (*Boselaphus tragocamelus*), also known as the blue bull, poses a significant threat to mustard crops in all the sampled districts due to its feeding behavior and preferences. The long height of the Coral-432 hybrid mustard variety appears to be a major factor contributing to crop destruction by Nilgai and renders upper plant parts, such as leaves, stems, and flowers, vulnerable to Nilgai's consumption, causing substantial damage. Physical harm from browsing leads to stem breakage and bending, weakening structural integrity, and facilitating lodging. This disrupts photosynthesis, retarding energy and nutrient production, stunting growth, and impairing yield. Cumulative effects result in fewer flowers, pods, and seeds, compromising overall productivity. The variety's height amplifies vulnerability to Nilgai's impact, exacerbating crop damage compared to shorter counterparts.



Source: 2 Estes, R. (2023, September 21). nilgai. *Encyclopaedia Britannica*.
<https://www.britannica.com/animal/nilgai>

Research has shown that Nilgai grazing can lead to direct yield losses in crops like wheat, maize, and mustard *Jhala et al. (2004)*. The preference for taller crops and the associated damage to plant parts significantly contribute to yield reduction. Studies suggest that effective

strategies, such as physical barriers, repellents, and habitat management, can help mitigate Nilgai-related crop damage and losses *Lakhawat (2015)*.

3. Impact of Parasite Weed on Mustard Crop:

Yield losses in the Mustard crop can be attributed to the parasitic weed *Orobanchae aegyptiaca*, commonly known as Egyptian broomrape. This weed significantly impacts crop productivity by attaching to mustard plants' roots, siphoning off water, nutrients, and energy. The presence of *Orobanchae aegyptiaca* can weaken mustard plants, resulting in stunted growth, reduced photosynthesis, and ultimately decreased yield. Prevention of *Orobanchae* infestation involves a combination of cultural, chemical, and biological



Source: 3 www.knowyourweeds.com

strategies. Practices such as crop rotation, deep plowing, and maintaining proper spacing between plants can help disrupt the weed's life cycle. Additionally, the application of pre-emergence herbicides and use of resistant mustard varieties can contribute to effective management. Scientific research emphasizes the importance of integrated weed management approaches to combat *Orobanchae aegyptiaca* infestations and safeguard mustard crop yield *Sheoran et al. (2017)*.

Chapter 7: Key Findings & Recommendations

7.1 Key Findings

7.1.1 Dissemination of Scheme Information and Awareness:

Information about the Hybrid Mustard scheme was primarily disseminated through village-level meetings and door-to-door interactions by Krishak Mitra, supported by banners/Hoardings and posters across the villages. Also Majority of beneficiaries were aware of the benefits of hybrid mustard cultivation, indicating a demand for such varieties even beyond the scheme's distribution.

7.1.2 General Profile of Beneficiaries:

Beneficiaries are primarily from Other Backward Classes (OBC) (62%), followed by General Category (21%), Scheduled Caste (12%), and Scheduled Tribe (5%). A significant emphasis on education, with equal percentages (30%) of beneficiaries having completed upper primary and senior secondary education, while 23% pursued higher education. Most beneficiaries (88%) are engaged in agriculture, while a small percentage (2%) practice animal husbandry for full time, and some (7%) are involved in labour-related activities or small enterprises.

7.1.3 Financial Status:

A large majority (86%) of beneficiaries are above the poverty line, while 12% are below it, indicating a stable financial status for most, with vulnerable households in need of support.

7.1.4 Land Holding Size:

A substantial portion of beneficiaries have small (42%) and semi-medium (32%) land holdings, while a smaller proportion have marginal (7%) and large (2%) holdings. Medium-scale farmers (holding 4 to 10 hectares) constitute 17% of beneficiaries.

7.1.5 Income from Primary Source:

Diverse income distribution with 43% falling in the 75,000 to 125,000 rupees range, and 32% in the 125,000 to 250,000 rupees range.

7.1.6 Engagement in Primary Source of Income:

Majority of beneficiaries (83%) engage in farming for 6 to 9 months, while 13% are involved year-round and 4% seasonally (3 to 6 months).

7.1.7 Reasons for Cultivating Mustard:

Economic factors such as low cultivation cost, higher income generation, and increasing market demand are the primary motivations for farmers to choose mustard cultivation. Mustard's lower water requirements, ease of cultivation, and adaptability to local Agro-climatic conditions contribute to its popularity.

7.1.8 Duration of Time Involved in Mustard Cultivation:

More than half of the sampled beneficiaries have been involved in mustard cultivation for over 10 years, indicating their expertise and commitment.

7.1.9 Area of Land Used for Cultivation:

A majority of beneficiaries (51%) cultivate mustard on less than 1 hectare, while 40% cultivate on 1 to 2 hectares.

7.1.10 Average Production Before and After Demonstration:

Hybrid Mustard (Coral-432) demonstrated increased average production compared to Common Mustard (certified seed) across all sampled districts.

7.1.11 Average Income Generated After Demonstration:

Cultivating Hybrid Mustard (Coral-432) yielded higher profits per hectare compared to Common Mustard (certified seed) in all districts. Mandsaur had the highest average profit per hectare, followed by Neemuch, Ashoknagar, and Shivpuri.

7.1.12 Adoption of Hybrid Mustard Variety:

65% of beneficiaries continued cultivating Hybrid Mustard after the demonstration, primarily due to increased productivity and income. Seed availability and accessibility influenced seed adoption, with some beneficiaries shifting to alternative varieties due to availability.

7.1.13 Change in Cultivation Area After Demonstration:

59% of respondents reported an increase in cultivation area after the demonstration, reflecting positive outcomes and confidence in Hybrid Mustard's performance.

7.2 Recommendations:

- Implement targeted financial inclusion initiatives to support beneficiaries below the poverty line and enhance their economic stability.
- Invest in research for developing pest-resistant, locally adaptable hybrid mustard varieties with shorter statures.
- Ensure timely availability of quality seeds, fertilizers, and pest management resources to support sustainable hybrid mustard cultivation and market linkages.
- Encourage livelihood diversification by promoting entrepreneurial activities and non-farm employment options.
- Develop inclusive land use policies, especially for medium-scale farmers, to enhance productivity and sustainability.
- Establish continuous monitoring and evaluation mechanisms for scheme implementation and beneficiary progress to facilitate timely interventions.
- Ensure timely and consistent availability of hybrid seeds like Coral-432 to meet cultivation demands and prevent disruptions.
- Continue educating farmers about hybrid mustard benefits and offer training in modern farming techniques to enhance productivity.
- Monitor and improve seed quality to address disease susceptibility concerns in the long-term adoption of hybrid varieties.
- Explore ways to reduce the economic burden of seed costs, encouraging wider adoption of hybrid seeds.
- Provide a variety of hybrid mustard options tailored to diverse Agro-climatic conditions, catering to farmers' specific needs.
- Invest in ongoing research to develop hybrid varieties that address multiple challenges like pest resistance, disease resilience, and high yields.
- Facilitate sharing of experiences and success stories among farmers to inspire wider adoption of Hybrid Mustard.

- Promote sustainable agriculture practices, including crop rotation and soil health management, for enhanced long-term benefits.

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Annexure-1

Proforma for Detailed Project Report (DPR) Targets for year 2018-19

Name of Project: Project to Conduct Demonstration of Hybrid Mustard Seed for income generation of farmers

Quantification of Physical and Financial targets for the project submitted under RKVY during 2018-19

S.No	District	Proposed Target for year 2018-19					
		Area Covered (ha)	No. of beneficiary	No .of Hybrid Mustard Seed Demonstration (ha/No)	Quantity of Hybrid Mustard seed in (Qtl.)	Total Cost of seed in Lakh	Total Subsidy given by the Project in Lakh
1	2	3	4	5	6	7	8
1	mandsour	38000	3000	3000	120	60.00	60.00
2	Neemuch	20000	2000	2000	80	40.00	40.00
3	Morena	145000	14000	14000	560	280.00	280.00
4	Shyopure	17000	1500	1500	60	30.00	30.00
5	Bhind	168000	16400	16400	656	328.00	328.00
6	Gwalior	40000	4000	4000	160	80.00	80.00
7	Shivpuri	54000	5400	5400	216	108.00	108.00
8	Guna	14000	1400	1400	56	28.00	28.00
9	Ashoknagar	7000	700	700	28	14.00	14.00
10	Datiya	16000	1600	1600	64	32.00	32.00
	TOTAL	5190000	50000	12500	2000	1000.00	1000.00

From the Field:





District Mandsaur





District Neemuch





District Ashoknagar





District Shivpuri

