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ANALYSIS OF SOCIO-ECONOMIC CHARACTERISTICS OF MUSTARD FARMERS WITH RESPECT TO PACKAGES AND PRACTICES IN BADAUN DISTRICT, U.P., INDIA

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ABSTRACT

The present study aimed to analyze the socio-economic characteristics of mustard farmers with respect to their adoption of recommended package of practices in Badaun district of Uttar Pradesh. Mustard is one of the major oilseed crops of the region and plays a significant role in enhancing farmers' income and livelihood security. Understanding the socio-economic profile of farmers is essential for assessing their level of awareness, adoption behavior, and constraints related to improved production technologies. The study was conducted in Islamnagar and Bisauli blocks of Badaun district, which were purposively selected due to their prominent area under mustard cultivation. From each block, five villages having the highest mustard-growing area were selected, making a total of ten villages. A total of 120 mustard growers were selected through proportionate random sampling. Primary data were collected through a pre-tested structured interview schedule, while secondary data were gathered from relevant reports and publications. The socio-economic variables considered in the study included age, education, caste, family size, landholding, annual income, occupation, farming experience, social participation, extension contact, and mass media exposure. The findings revealed that a majority of the respondents belonged to the middle age group and were literate, indicating a favorable condition for the adoption of improved agricultural practices. Most of the farmers belonged to Other Backward Castes, followed by Scheduled Castes, and had nuclear families. A considerable proportion of respondents were small and marginal farmers with agriculture as their primary occupation. Moderate levels of annual income, farming experience, extension contact, and mass media exposure were observed among the respondents. With regard to the package of practices, the adoption level was found to be moderate for most of the recommended practices such as improved varieties, sowing time, seed rate, fertilizer application, irrigation, and plant protection measures. However, gaps were noticed in the adoption of scientific nutrient management and pest control practices. The study concludes that socio-economic characteristics significantly influence the adoption of mustard production technologies. Strengthening extension services, improving access to timely information, and organizing need-based training programs can enhance farmers' adoption of the recommended package of practices, thereby improving mustard productivity and farmers' socio-economic status in the study area.

Keywords **:** Badaun, mustard, publications, annual, analysis.

Introduction

Oilseeds are second only to cereals in importance to Indian agriculture, economy, and food security. Indian rapeseed–mustard is a prominent oilseed crop because to its flexibility, low inputs, and edible oil output. Mustard is the third largest oilseed crop after soybean (Glycine max) and palm oil. Rapeseed–mustard production in India accounts for 11% of the

worldwide mustard industry. Global estimates show rapeseed and mustard production on 36.59 million hectares generating 72.37 million tonnes with an average productivity of 1980 kg ha^{-1} in 2018-19. Since it has 19.8% of world oilseed acreage and 9.8% of production, India is crucial. Indian oilseed production is dominated by rapeseed–mustard, one of seven edible oilseed crops. It produces 28.6% of oilseeds and ranks second in area and productivity after groundnut. More than one-third of edible oil production is mustard oil. Grown on 6.23-6.75 million hectares, the crop produces 8.6 million tonnes annually with an average productivity of 1123-1346 kg ha^{-1}. Although important, India's production is much lower than the global average, indicating a large yield gap. This yield discrepancy is due to incomplete farming techniques, resource constraints, and poor production technology diffusion. Mustard is unique in Indian agriculture because to its adaptability to numerous agroclimatic situations. It grows well in rain-fed and irrigated tropical and subtropical climates. It needs cold, dry growth and clear, dry maturity. India's rabi season (September–October to February–March) produces most mustard. This crop fits many cropping systems and is good for marginal and small farmers because to its low water and cultivation expenses. Rajasthan, Uttar Pradesh, Haryana, Madhya Pradesh, and Gujarat produce most mustard. Uttar Pradesh produces 14.03–13.78% of India's mustard. The state's average production is 1123-1245 kg ha^{-1}, comparable to the national average but lower than potential yield with better management. Small and marginal farmers in Uttar Pradesh's Mid-Western Plain Zone depend on mustard. Badaun has low productivity despite its large agricultural area. In the 2010-2011 agricultural season, Badaun district produced 32,822 metric tonnes of mustard on 21,202 hectares, yielding 1309 kg ha^{-1}, much lower than Haryana. Farmers' improper cultivation practices cause the mustard yield gap.

Mustard has nutritional and economic value. Northern Indians use mustard oil to fry, pickle, and spice curries and vegetables. Mustard seed oil has 37–49% oleic and erucic acids. Mustard oil is used in medication, hair, lubrication, grease, soap, leather tanning, and cuisine. Oilcake, containing 5.1% nitrogen, 1.8% phosphorus, and 1.1% potassium, is used as animal feed and organic manure. Since its leaves and stems are nutritious fodder and young leaves are consumed as green vegetables, mustard helps farms survive. Despite its potential, mustard cultivation in India is limited. The main hurdles are marginal land cultivation, unpredictable rainfall, unavailability of short-duration and drought-resistant cultivars, pests and diseases, inadequate weed control, seed quality, and outdated production technologies. Research institutions have improved high-yielding varieties (HYVs) and integrated crop management, but field adoption is uneven. Between better technologies and farmers' conventional methods, studies show 12–110% productivity gains across states. Bridging the adoption gap may increase mustard production due to the 36% national yield discrepancy.

Under late Prime Minister Shri Rajiv Gandhi, India launched the Technology Mission on Oilseeds (TMO) in 1986 to achieve edible oil self-sufficiency. The goal was edible oil independence, import elimination, and oilseed production expansion through integrated research, extension, input supply, and market aid. The mission targeted 17 states' thrust districts for integrated oilseed crop development. The mission boosted territory and production, but technology adoption and sustainability remain issues. The Indian Council of Agricultural Research (ICAR), State Agricultural Universities (SAUs), Krishi Vigyan Kendras (KVKs), and Directorate of Rapeseed-Mustard Research (DRMR) have developed, validated, and distributed technologies to address these issues. Founded in 1993 and rebuilt in 2009, the DRMR coordinates national rapeseed-mustard research and promotes sustainable farming. KVKs, district-level knowledge and resource centres, exhibit improved technology on farms through frontline demonstrations (FLDs) and on-farm trials (OFTs). Numerous studies suggest that FLDs improve farmers' knowledge, talents, and adoption of recommended approaches, enhancing yields and profitability.

Multiple sources reveal that even proven and financially enticing solutions are partially implemented. Farmers' socio-personal qualities, socio-economic status, psychological orientation, communication exposure, and institutional aid affect adoption behaviour. Lack of timely information, inadequate training, limited access to quality inputs, market instability, and low minimum support prices further hinder field acceptance of suggested techniques. Adoption gaps must be understood for effective extension methods. In Uttar Pradesh's Badaun district, mustard production is poor but widespread. This district shows how incomplete acceptance has hampered full use of improved technologies. The adoption gap in suggested mustard cultivation approaches may identify underutilised technology components and why. This assessment is needed to increase mustard acceptance and productivity by farmers. Mustard's growing importance in India's edible oil market and farmer yield inequalities warrant this study. In land-scarce India, reducing the adoption gap between suggested and actual agricultural practices

is crucial for productivity without increasing farmed area. This study will help agricultural planners, extension personnel, academics, and legislators identify mustard grower technology adoption constraints and develop solutions.

Materials and Methods

- The present study was conducted in Islamnagar and Bisauli blocks of Badaun district, Uttar Pradesh. These blocks were selected purposively due to their easy accessibility to the researcher and their significant area under mustard cultivation, which facilitated effective sampling and data collection. In each selected block, a comprehensive list of villages was prepared based on the extent of mustard production. From this list, five villages having the highest area under mustard cultivation were purposively selected from each block, making a total of ten villages for the study.
- A total sample of 120 mustard growers was selected from the chosen villages using simple random sampling technique, comprising 60 respondents from each block. This ensured adequate representation of farmers from both blocks. A structured interview schedule was developed in accordance with the objectives of the study and the variables under investigation. The schedule was finalized after consulting relevant literature, research reports, and experts in agricultural extension and entomology to ensure content validity and clarity.
- Data were collected through personal interviews with the respondents to obtain reliable and firsthand information. The dependent variable of the study consisted of different recommended mustard cultivation practices, categorized under cultural practices and allied aspects. The opinions of the respondents regarding these practices were elicited through carefully framed statements. The responses were recorded, and the frequency and percentage of each opinion were calculated. Based on these values, ranks were assigned to determine the intensity and priority of the opinions expressed by the respondents.
- Age refers to the chronological age of the respondents in terms of the number of years completed by them at the time of enquiry, based on their actual age. The respondents were classified into three age categories on the basis of mean ± standard deviation. Age was worked out separately for two types: (1) male and (2) female. Scores of 1 and 2 were assigned to male and female respondents, respectively. Education level of the respondents was assessed on the basis of the number of years of formal education completed. Scores were assigned to eight different levels of education.
- Caste is a social category in which members are assigned a permanent status within a given social hierarchy. The respondents were categorized into five caste groups. Family type refers to whether the respondent belonged to a single/nuclear family or a joint family. Accordingly, family type was studied under two categories: joint family and nuclear family.
- Family size refers to the total number of members in the respondent's family. It was grouped into three categories based on mean and standard deviation, namely: (1) mean – S.D., (2) mean ± S.D., and (3) mean + S.D. The scores ranged from a minimum of 3 to a maximum of 15.
- Land holding refers to the total area of land (in acres) owned and used by the respondent for vegetable cultivation. Annual income refers to the total income earned by the respondents from all available sources during a particular year and was calculated in Indian rupees. The respondents were classified into three income categories based on mean ± standard deviation.
- Occupation of the respondent's family was determined on the basis of enterprises contributing more than 50 per cent of the total income, which was considered the main occupation, while enterprises contributing less than 50 per cent were considered subsidiary occupations.
- Mass media exposure was operationalized as the degree to which a respondent was exposed to different plant protection measures of vegetable crops through various media. It was measured by assigning self-scores to the responses recorded on a three-point continuum: often, sometimes, and never, with scores of 2, 1, and 0, respectively. The respondents could obtain a minimum score of 0 and a maximum score of 9. The total score indicated the degree of mass media exposure, and based on the range of scores, respondents were categorized into three groups.

Results and Discussion

This document presents a structured socio-economic profile of farmers in the Badaun district of Uttar Pradesh regarding the adoption of mustard crop practices. The adoption of new technology is directly correlated with the socio-economic status of the individual. This study relates the socio-economic status of farmers with their knowledge and adoption levels regarding the package of practices for the mustard crop in Badaun district, Uttar Pradesh.

Key Indicators Studied:

1. Age
2. Education
3. Caste
4. Type of Family
5. Size of Family
6. Total Landholding
7. Annual Income
8. Occupation
9. Mass Media Exposure
10. Source of Irrigation

Age

The results indicate that a majority of respondents (68.34%) belonged to the middle-age group, followed by the old-age group (25.00%), while only a small proportion (6.66%) were young. This suggests that agricultural activities are predominantly managed by middle-aged farmers who possess adequate experience, decision-making ability, and economic responsibility. Middle-aged farmers are generally more receptive to improved agricultural practices due to their balanced outlook and risk-bearing capacity. The lower participation of young farmers may be due to migration towards education and non-farm employment. These findings are consistent with earlier studies reported by Carver, et al. (2018).

Table 1: Distribution of respondents according to their age n = 120

S. No.	Categories (Years)	Frequency	Percentage
1.	Young (Up to 24.67)	8	6.66
2.	Middle (24.68–54.72)	82	68.34
3.	Old (54.73 and above)	30	25.00
Total		**120**	**100**

Statistics: Mean = 39.70 | S.D. = 15.03 | Min = 20 | Max = 75

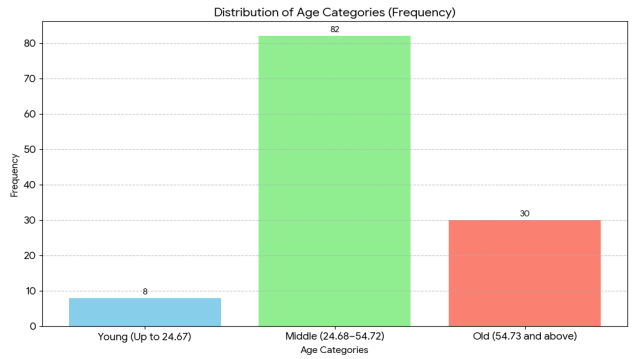

Fig. 1: Distribution of respondents according to their age

Education Level

The findings reveal that an overwhelming majority of respondents (96.67%) were literate, while only 3.33% were illiterate, indicating a high level of educational attainment among the study population. Literacy plays a crucial role in enhancing farmers' awareness, understanding, and adoption of improved agricultural technologies and recommended package of practices. Literate farmers are generally better equipped to access extension services, interpret technical information, and make informed farm decisions. The high literacy rate observed in the study may positively influence innovation adoption and farm productivity. Similar results were reported by Burke *et al*. (2016).

Table 2: Distribution of respondents according to education n = 120

S. No.	Categories	Frequency	Percentage
1.	Illiterate	4	3.33
2.	Primary	4	3.33
3.	Middle School	31	25.84
4.	High School	41	34.16
5.	Intermediate	21	17.50
6.	Undergraduate	16	13.33
7.	Post-Graduate & Above	3	2.50
Total		**120**	**100**

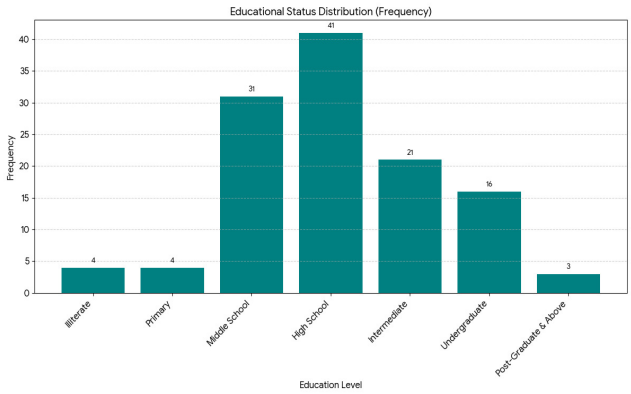

Fig. 2: Distribution of respondents according to their Education

Caste

The caste-wise distribution of respondents shows that the highest proportion (47.50%) belonged to the Other Backward Castes (OBC), followed by Scheduled Castes (32.50%). This reflects the social structure of the rural farming community, where OBC and SC households constitute a major share of the agricultural workforce. Farmers from these categories are often highly dependent on agriculture for their livelihood and actively participate in farming operations. The dominance of OBC and SC respondents may also indicate their greater involvement in crop production activities at the village level. Similar findings have been reported by Bhutto, et al. (2022)

Table 3: Distribution of respondents according to caste

S. No.	Categories	Frequency	Percentage
1.	SC	39.00	32.50
2.	ST	6.00	5.00
3.	OBC	57.00	47.50
4.	GENERAL	18.00	15.00
Total		**120**	**100**

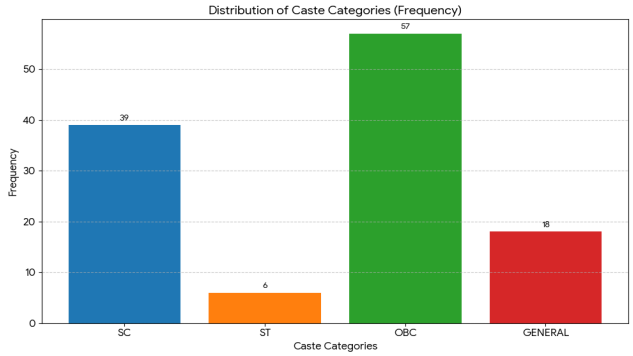

Fig. 3: Distribution of respondents according to their caste

Family Type

The findings indicate that a majority of respondents (55%) belonged to nuclear families, while 45% were part of joint families, suggesting a gradual shift from the traditional joint family system in rural areas. This transition may be attributed to socio-economic changes, increased individual decision-making, migration, and changing livelihood patterns. Nuclear families often encourage independent farm management and quicker decision-making regarding adoption of improved agricultural practices. However, joint families continue to play an important role by providing shared labour and resources. Similar trends of declining joint family systems in rural India have been reported by Johnsen *et al.* (2022).

Table 4 : Distribution of respondents according to family type

S. No.	Categories	Frequency	Percentage
1.	Joint Family	54	45.00
2.	Nuclear Family	66	55.00
Total		**120**	**100**

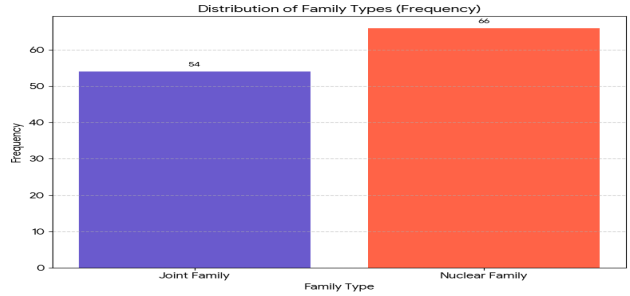

Fig. 4: Distribution of respondents according to their family types

Family Size

The results show that a majority of respondents (60%) had a medium-sized family consisting of 6–11 members, with an average family size of 8.75 members. This indicates the prevalence of relatively large household sizes in the study area, which may be associated with the availability of family labour for agricultural activities. Larger families can support farm operations by reducing dependence on hired labour and sharing responsibilities. However, increased family size may also lead to higher consumption needs and pressure on farm income. Similar observations were reported by Gowda *et al.* (2015).

Table 5: Distribution of respondents according to family size

S. No.	Categories	Frequency	Percentage
1.	Small (Up to 6.02 members)	25.00	20.84
2.	Medium (6.03–11.47)	72.00	60.00
3.	Large (11.48 and above)	23.00	19.16
Total		**120**	**100**

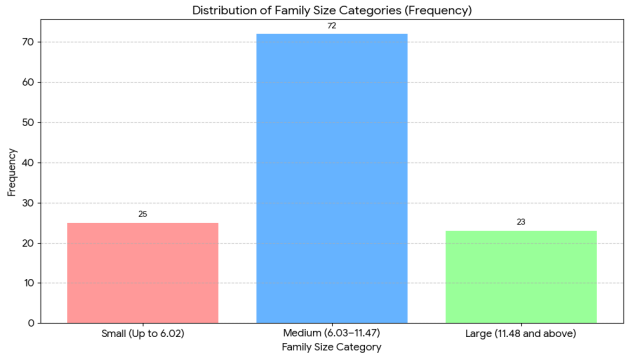

Fig. 5: Distribution of respondents according to their family size

Size of Landholding

The study reveals a high concentration of marginal and small farmers, with the average landholding size recorded at 1.15 hectares. This reflects the prevailing pattern of land fragmentation in Indian agriculture, where the majority of farmers operate on small and marginal holdings. Such limited land resources often restrict farmers' capacity to adopt capital-intensive technologies and influence overall farm productivity and income levels. However, small landholders tend to rely more on family labour and are often motivated to intensify cultivation through improved practices. These findings are in agreement with earlier studies by Kuoljok (2019).

Table 6: Distribution of respondents according to landholding

S. No.	Categories	Frequency	Percentage
1.	Marginal (Below 1 ha.)	41.00	34.19
2.	Small (1–2 ha.)	39.00	32.50
3.	Medium (4–10 ha.)	28.00	23.33
4.	Large (10 ha. and above)	12.00	10.00
Total		**120**	**100**

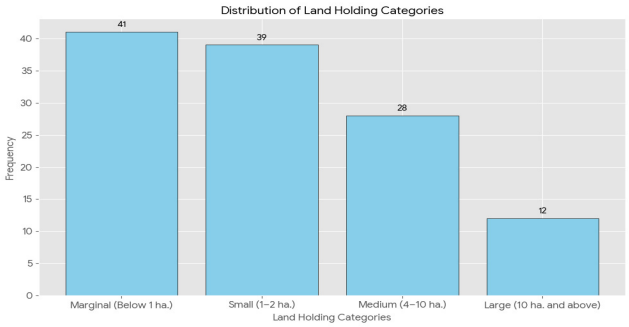

Fig. 6: Distribution of respondents according to their landholding

Occupation

The occupational distribution shows that agriculture was the primary occupation for a majority of respondents (65.33%), followed by agricultural labour (22.50%). This highlights the dominant role of agriculture as the main source of livelihood in the study area. Dependence on farming indicates limited diversification of income sources, especially among small and marginal farmers. The substantial proportion of labourers suggests economic vulnerability and reliance on wage employment to supplement farm income. Similar findings were reported by Nitu *et al.* (2019).

Table 7: Distribution of respondents based on occupation

S. No.	Categories	Frequency	Percentage
1.	Agriculture	79.00	65.33
2.	Services	4.00	3.33
3.	Agriculture + Services	6.00	5.00
4.	Business	4.00	3.33
5.	Laborer	27.00	22.50
Total		**120**	**100**

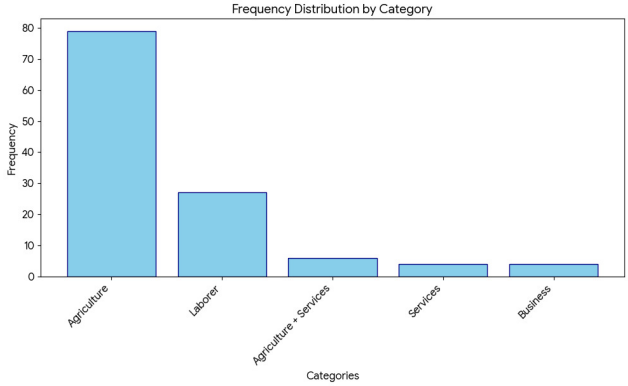

Fig. 7: Distribution of respondents according to their occupation

Annual Income

The income distribution reveals that an overwhelming majority of respondents (87.50%) belonged to the lower-income group, earning up to □100,000 per year. This indicates a low economic status of farming households in the study area, largely due to small landholdings, dependence on rainfed agriculture, and limited access to alternative income sources. Low income levels may constrain farmers' ability to invest in improved inputs, technologies, and farm mechanization. Such economic limitations can adversely affect productivity and livelihood security. These findings are in line with the observations Haileyesus *et al.* (2021).

Table 8: Distribution of respondents according to annual income

S. No.	Categories (Rs.)	Frequency	Percentage
1.	Small (Up to 100,000)	105	87.50
2.	Medium (100,001–300,000)	11	9.16
3.	Large (300,001 and above)	4	3.33
Total		**120**	**100**

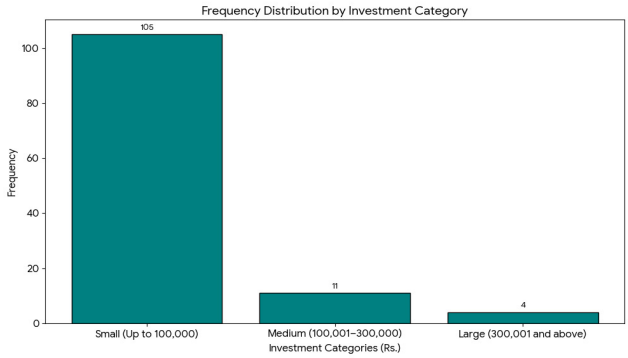

Fig. 8 : Distribution of respondents according to their annual Income

Mass Media Exposure (Detailed)

The table illustrates the frequency of farmers' interaction with various communication channels. Television and the internet emerged as the most commonly used media, with a considerable proportion of respondents using them often or sometimes, indicating their importance in information dissemination. Smartphones also showed moderate usage, reflecting the growing penetration of mobile technology in rural areas. In contrast, radio, computers/laptops, and magazines were rarely used, suggesting a decline in traditional media and limited access to digital devices. Newspaper readership was moderate, indicating its continued relevance. These findings align with studies by Foley *et al.* (2019).

Table 9 : Distribution of respondents according to Mass Media Exposure

S. No.	Items	Often	Sometime	Never
1.	T.V	43 (35.83%)	56 (46.66%)	21 (17.50%)
2.	Radio	16 (13.33%)	26 (21.66%)	78 (65.00%)
3.	Computer/Laptop	0 (0%)	7 (5.83%)	113 (94.16%)
4.	Magazines	0 (0%)	12 (10.00%)	108 (90.00%)
5.	Smartphone	42 (35.00%)	37 (30.83%)	41 (34.16%)
6.	Internet	47 (39.16%)	58 (48.33%)	15 (12.50%)
7.	Newspaper	33 (27.50%)	47 (39.16%)	40 (33.33%)

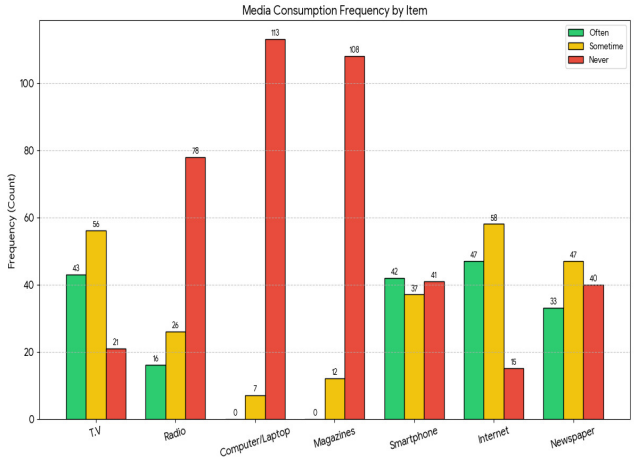

Fig. 9 : Distribution of respondents according to Mass Media Exposure

Source of Irrigation

The findings indicate that tube wells were the primary source of irrigation for a majority of respondents (75%), followed by pumping sets (22.50%). This highlights the heavy dependence of farmers on groundwater resources for agricultural production. The dominance of tube wells suggests better control over irrigation scheduling, which is crucial for timely farm operations and crop productivity. However, excessive reliance on groundwater may raise concerns regarding sustainability and declining water tables. Pumping sets serve as an important supplementary source, especially for small and marginal farmers. Similar patterns have been reported by Korpale *et al.* (2016). Performance assessment of solar agricultural water pumping system. Energy Procedia, 90, 518-524.

Table 10 : Distribution according to source of irrigation

S. No.	Categories	Frequency	Percentage
1.	Tube well	90.00	75.00
2.	Pumping set	27.00	22.50
3.	Other	3.00	2.60
Total		**120**	**100**

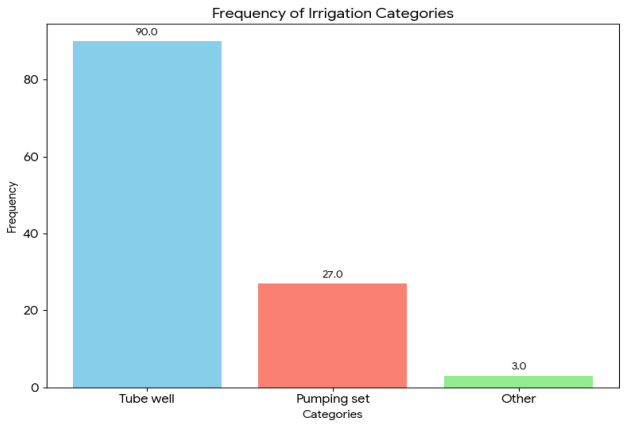

Fig. 10: Distribution according to source of irrigation

Conclusion

The majority of the respondents (68.34%) were found to be in the middle age group (24.68–54.72 years). A very high proportion of the respondents (96.67%) were literate. The maximum number of respondents (47.50%) belonged to the Other Backward Caste, followed by the Scheduled Caste (32.50%). More than half of the respondents (55.00%) belonged to joint families, whereas 45.00% were from nuclear families. Regarding family size, the majority of respondents (60.00%) belonged to medium-sized families (6.03–11.47 members), followed by small-sized families (20.84%) and large-sized families (13.16%). In terms of landholding, the maximum number of respondents (92.50%) were marginal farmers (below 1.0 ha), while only 7.50% belonged to the semi-medium category (2–4 ha). Agriculture was reported as the main occupation by an overwhelming

majority of respondents (77.50%), followed by labour work (22.50%). With respect to annual family income, the majority of respondents (87.50%) belonged to the low-income category (up to Rs. 1,00,000), followed by the medium-income group (Rs. 1,00,001–3,00,000) comprising 9.16%. Only 3.33% of the respondents belonged to the high-income category (above Rs. 3,00,001). Mass media exposure was highest through television and smartphones, followed by the internet, newspapers, radio, magazines, and computers/laptops. For irrigation purposes, an overwhelming majority of respondents (75.00%) used tube wells, followed by pump sets and other sources.

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