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Seeds of Change: Assessing Wheat Knowledge and Socio-profile in Rural Areas of Kharar, Tehsil of Punjab, India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

This study investigates the socio-profile status, agricultural practices, and knowledge acquisition among farmers in rural villages of the Punjab region, India. Employing a cross-sectional survey design, data was collected from farmers residing in five villages through structured questionnaires and face-to-face interviews. The demographic analysis revealed a balanced gender distribution, with a significant proportion falling within the 40-60 years age bracket, highlighting the maturity of the farming population. Educational attainment varied, emphasizing the need for targeted interventions to enhance access to higher education and vocational training programs. Findings indicated a high prevalence of smartphone usage among farmers, presenting opportunities for leveraging digital technology in agricultural extension services. Family compositions leaned towards nuclear families, while landholding patterns showcased the varied socio-profile landscape within the farming community. Peer networks and institutional support emerged as significant sources of agricultural information, underscoring the importance of collaborative approaches in knowledge

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dissemination. A notable increase in knowledge was observed among farmers after video presentations on wheat varieties, highlighting the efficacy of multimedia approaches in agricultural education. The study aimed to assess the impact of a video presentation on wheat cultivation on farmers' knowledge. Data from 60 farmers showed significant improvements in various aspects of wheat cultivation knowledge, including identifying suitable wheat varieties, understanding sowing and harvesting timing, and recognizing common wheat diseases. The mean percentage increase in knowledge was 103%, indicating the effectiveness of the educational program. These findings underscore the importance of targeted educational initiatives in promoting sustainable agriculture and improving farmers' livelihoods. Continued support and education efforts are essential for sustaining and enhancing these positive outcomes. However, the preference for sowing previous year's seeds over newly released varieties indicates the persistence of traditional practices and the need for targeted interventions to promote varietal adoption. Overall, this study provides valuable insights for policymakers and development practitioners to design context-specific interventions aimed at enhancing agricultural productivity, promoting sustainable livelihoods, and ensuring food security for rural populations in the Punjab region and beyond.

Keywords: Socio-profile; agricultural practices; knowledge acquisition.

1. INTRODUCTION

Punjab, renowned for its agricultural prowess, harbors a complex socio-profile landscape within its rural villages. Understanding the socio-profile of farmers is crucial for designing effective policies and interventions to support rural development. This paper examines the socio-profile attributes of farmers in Punjab villages through a comprehensive survey-based analysis.

The rural landscape of Punjab, often referred to as the "Granary of India," is characterized by vibrant agricultural activity that forms the backbone of the state's economy [1]. It is essential to comprehend the socio-profile backgrounds of farmers in Punjab's villages to develop focused strategies that promote rural advancement, boost agricultural output, and reduce poverty.

Wheat is a staple crop in Punjab, occupying a sizable portion of agricultural land and contributing to the region's economy. However, the effectiveness of wheat cultivation depends on farmers' knowledge about suitable wheat varieties and optimal seed rates. Therefore, this study aims to assess farmers' knowledge of wheat varieties, seed rates, and their socio-profile in five villages of Punjab with 60 farmers as participants.

The intricate interplay of factors such as landholding size, access to credit, education levels, technological adoption, and off-farm employment opportunities delineates the socio-profile landscape of these farming communities [2]. Yet, despite the critical role they play in driving the agricultural engine of Punjab, the socio-profile dynamics of farmers in its villages remain understudied and poorly understood.

This research paper embarks on a journey to unravel the socio- profile of farmers in Punjab villages through a comprehensive survey- based analysis. We want to explore the details of farmers' traits, land ownership, where they get money from, and what resources they have. This will help us understand the farming community in Punjab's countryside more thoroughly.

Additionally, A notable increase in knowledge was observed among farmers after video presentations on wheat varieties, as assessed through a structured questionnaire related to the video content. This increase in knowledge is crucial for enhancing agricultural practices and productivity among farmers in Punjab villages, thereby contributing to overall rural development.

This study aims to fill the gaps in our understanding of the socio-profile backgrounds of farmers in Punjab villages by drawing upon a wide range of existing literature on Indian agriculture, rural development, and socio-profile dynamics. In this research, it is explained how the data is collected and analyzed, share the results of our survey-based investigation, and discuss the implications of these findings. Through this effort, we hope to shed light on the socio-profile realities faced by farmers in Punjab villages and contribute to the development of more informed and inclusive strategies for sustainable rural development and agricultural success.

2. LITERATURE REVIEW

Previous research on wheat cultivation in Punjab emphasizes the critical role of adopting suitable varieties and optimal seed rates to maximize yield and quality [3]. Wheat is a major staple crop in Punjab, and the choice of variety and seed rate directly impacts farmers' productivity and profitability. Studies have shown that farmers' knowledge about different wheat varieties and seed rates significantly influences their agricultural practices [4]. Existing studies emphasize the multifaceted nature of Indian agriculture, where socio-profile factors play a pivotal role in shaping rural livelihoods and agricultural outcomes. Researchers have explored various dimensions of socio-profile dynamics, including landholding patterns, access to credit and resources, education levels, and technological adoption among farmers. Studies such as [5] have highlighted the socio-profile characteristics of rural households in Punjab, shedding light on income sources, asset ownership, and consumption patterns. Moreover, investigations by [6] have examined the impact of landholding patterns on the socio-profile status of farm households in Punjab, revealing disparities in wealth distribution and resource access. These studies underscore the importance of understanding the socio-profile context in designing targeted interventions to promote rural development and enhance agricultural productivity. In addition to the critical role of wheat cultivation highlighted in existing literature, it's essential to acknowledge the broader context of agricultural diversification and sustainability. Punjab's overreliance on wheat and rice monoculture has raised concerns about environmental degradation, water depletion, and vulnerability to climate change. Studies such as those by [7] underscore the urgent need for diversification towards high-value crops, agroforestry, and sustainable farming practices to ensure long-term food security and environmental resilience.

Furthermore, the socio-profile dynamics of farmers intersect with broader socio-economic trends shaping rural India. Migration, for instance, plays a significant role in shaping household dynamics and livelihood strategies in Punjab's villages. Understanding the interplay between migration patterns, remittance flows, and agricultural practices is crucial for devising holistic development strategies that harness the potential of both internal and external resources [8].

Moreover, the advent of digital technologies and e-agriculture initiatives has the potential to revolutionize farming practices and empower smallholder farmers. Studies such as those by [9] have highlighted the transformative impact of mobile-based agricultural advisory services, market linkages, and financial inclusion initiatives in enhancing farmers' socio-economic well-being. Integrating such technological interventions into the socio-profile analysis can provide insights into the adoption barriers and opportunities for scaling up inclusive digital solutions in rural Punjab.

However, while existing research provides valuable insights into broader trends and patterns, there remains a dearth of literature specifically focusing on the socio- profile of farmers in Punjab villages [10]. This study seeks to address this gap by conducting a detailed survey-based analysis, thereby contributing to a deeper understanding of the socio-profile realities faced by farming communities in rural Punjab.

3. METHODOLOGY

3.1 Study Design

This study employed a cross-sectional survey design to assess the socio profile status of farmers in five rural villages located in the Punjab region of India. Cross-sectional surveys are well-suited for identifying patterns and associations between socio-profile variables and agricultural practices within a specific timeframe. By examining these relationships, the study aims to uncover factors influencing farmers' livelihoods and agricultural productivity in the Punjab region. Overall, the cross-sectional survey design provides a practical and efficient means of gathering data to assess the socio-profile status of farmers in the Punjab region. We also performed a video presentation related to newly released wheat varieties and their performance along with their characteristics. To check the impact of video presentation and increase their knowledge about wheat varieties we prepared a structured questionnaire.

3.2 Participants

The study participants comprised farmers residing in five rural villages situated in Punjab, India. Employing a multistage sampling technique ensured a representative sample from diverse geographic areas within Punjab. Firstly, five villages were randomly selected. Within each

village, households engaged in agricultural activities were identified, and a systematic random sampling method was employed to select participants. Inclusion criteria encompassed individuals primarily engaged in farming as their occupation. Face-to-face interviews are conducted with selected farmers using structured questionnaires. These questionnaires were designed to gather comprehensive data on various socio profile aspects, landholding size, education level, extension contact, type of house, access to resources and services etc.

3.3 Data Collection

Data were collected through structured questionnaires administered via face-to-face interviews with the selected farmers. The questionnaire consisted of sections addressing various aspects of socio profile status, including landholding size, type of house, education level, farm implements, agricultural practices, access to resources and services, seed rate and varieties of wheat, etc. During the interview's, structured questionnaires were filled out based on the participants' responses. Participants were encouraged to provide accurate and honest information.

3.4 Data Analysis

The data analysis process involved the systematic examination and interpretation of the collected data to derive meaningful insights regarding the socio profile status of farmers in the Punjab villages. Quantitative data analysis was conducted using statistical software such as MS Excel.

Initially, descriptive statistics were computed to summarize the demographic and socio profile characteristics of the farmers. Measures such as means, frequencies, and percentages were utilized to provide a clear picture of the distribution of variables such as landholding size, education level, assets etc.

4. RESULTS AND DISCUSSION

4.1 Demographic Characteristics

The survey data collected from respondents provides comprehensive insights into various socio-profile and agricultural aspects among farmers in the surveyed region. Demographically, the respondents exhibited a balanced gender distribution, with 47% male and 43% female farmers, while 10% reported having children, indicating the family-centric nature of agricultural households (Fig.1).

Age-wise distribution revealed that most farmers fell within the 40-60 years age bracket (60%), suggesting a mature farming population, while a significant portion comprised individuals over 60 years (33%), with a smaller percentage below 40 years (7%). This age distribution reflects the generational transition occurring within farming communities, which has implications for succession planning and the adoption of modern farming practices (Fig. 2).

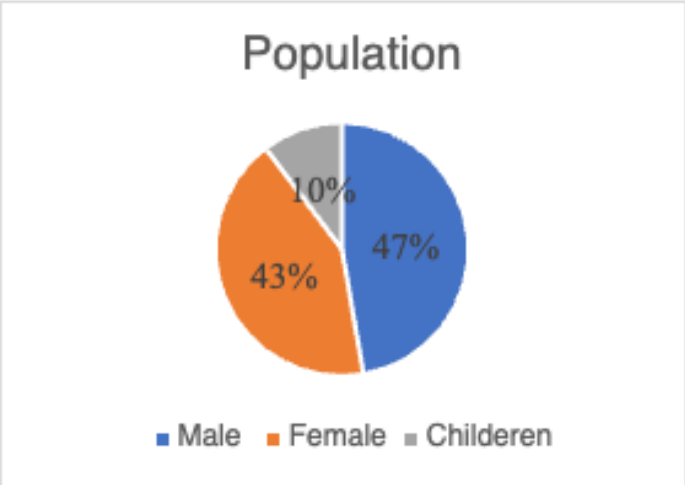

Fig. 1. Pie chart showing Population dynamics

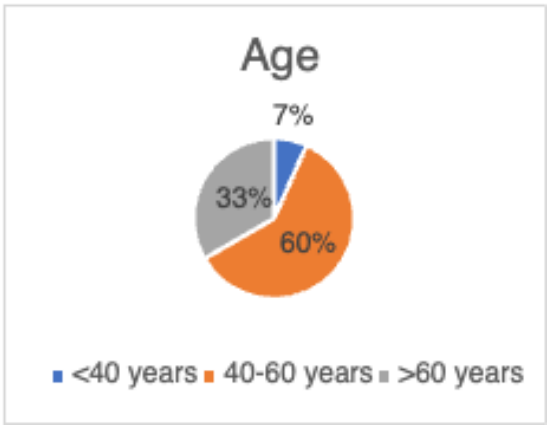

Fig. 2. Pie chart showing Age distribution

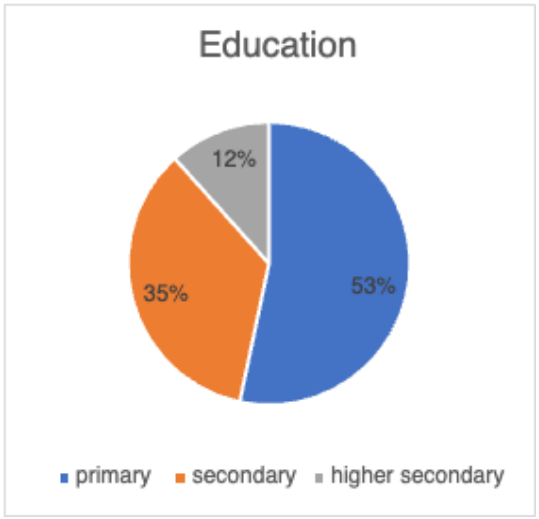

Fig. 3. Pie chart showing Education criteria

Educationally, the data highlighted varying levels of educational attainment among farmers, with a significant proportion having completed only primary school (53%), followed by those with senior secondary (35%) and higher secondary education (12%). This indicates a need for targeted interventions to enhance access to higher education and vocational training programs aimed at equipping farmers with the necessary knowledge and skills to adopt sustainable agricultural practices and adapt to evolving market demands (Fig. 3).

In terms of farming experience, most respondents reported having 20-40 years of experience (60%), indicating a wealth of practical knowledge and expertise within the farming community. However, it's noteworthy that a considerable proportion of farmers had less than 20 years of experience (22%), suggesting the emergence of a new generation of farmers, while 18% had over 40 years of experience, representing the seasoned veterans of agriculture. This diverse range of experience levels underscores the importance of knowledge exchange and mentorship programs to facilitate the transfer of traditional wisdom and innovative practices across generations (Fig. 4).

Telecommunication trends among farmers revealed a high prevalence of smartphone usage (92%), reflecting the increasing penetration of digital technology in rural areas and the potential for leveraging mobile applications and platforms to deliver agricultural extension services, market information, and weather forecasts. This widespread access to smartphones presents opportunities for enhancing information dissemination and communication channels within farming communities (Fig. 5).

Fig. 4. Pie chart showing Farming experience

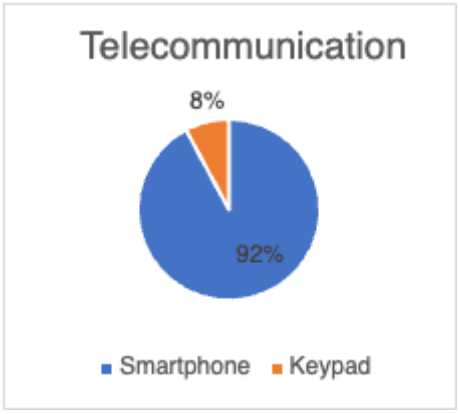

Fig. 5. Pie chart showing Telecommunication

Family compositions leaned towards nuclear families (89%), with joint families comprising a smaller percentage (11%). This demographic trend reflects broader societal shifts towards nuclear family structures and has implications for labor dynamics and resource management within agricultural households (Fig. 6).

The distribution of farmers based on landholding patterns categorized 27% as marginal, 41% as small, and 32% as medium farmers. This diversity in landownership highlights the varied socio-profile landscape of the farming community and underscores the importance of targeted support mechanisms and policy interventions tailored to the specific needs of each category (Fig. 7).

Regarding sources of agricultural information, friends/relatives (28%) and progressive farmers (21%) were cited most frequently, indicating the importance of peer networks and experiential learning in knowledge dissemination within farming communities (Fig. 8). Extension contacts were with State Agricultural Universities (SAU) (37%) and private agencies (30%), emphasizing the role of institutional support and private sector engagement in delivering agricultural advisory services and technology transfer (Fig. 9).

Farm machinery ownership was reported by 61% of farmers, indicating a significant level of mechanization within the farming community, while 39% reported renting machinery, suggesting the presence of rental markets for agricultural equipment and machinery (Fig.10).

Livestock ownership varied, with milch animals being the most common (59%), followed by both milch and non-milch animals (14%) and poultry (12%). Vaccination practices were prevalent among farmers with livestock, highlighting their awareness of animal health and welfare considerations (Fig.11).

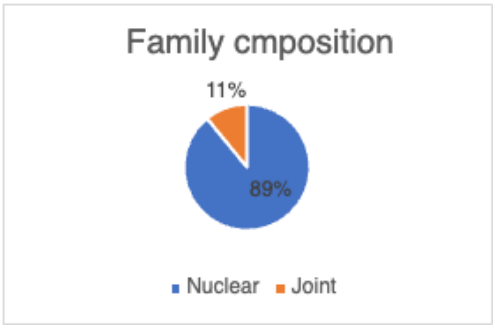

Fig. 6. Pie chart showing Family composition

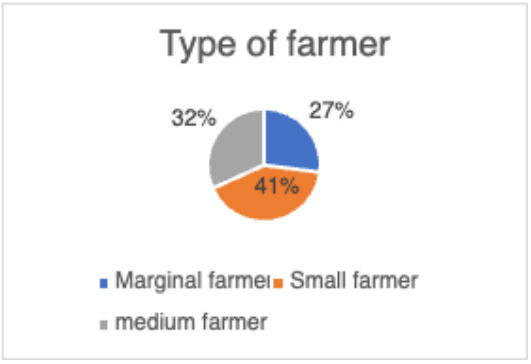

Fig. 7. Pie chart showing Type of farmer

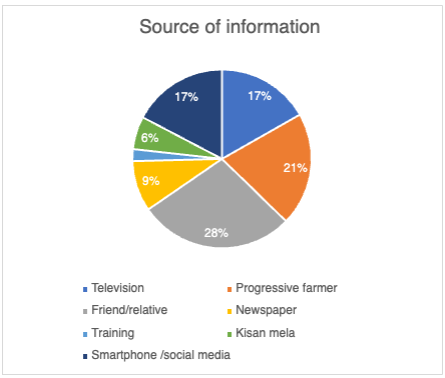

Fig. 8. Pie chart showing Source of information

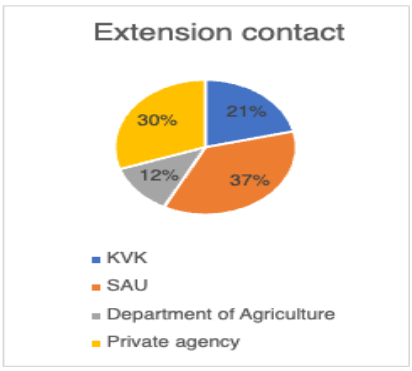

Fig. 9. Pie chart showing Extension contact

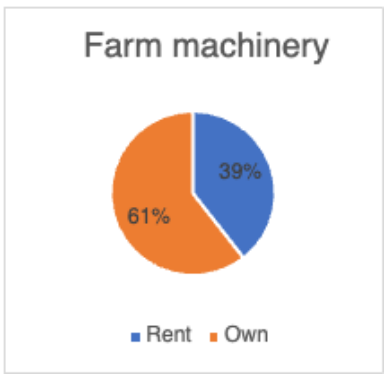

Fig. 10. Pie chart showing Farm machinery

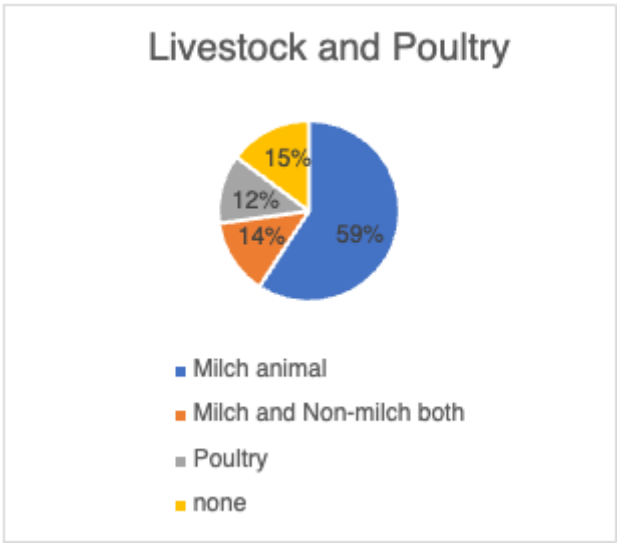

Fig. 11. Pie chart showing Livestock and Poultry

The data collected from 60 farmers before and after the video presentation on wheat cultivation revealed substantial improvements in their knowledge across various aspects. Significant increases were observed in farmers' awareness of crucial factors such as the variety having higher concentration of zinc (25% increase), the latest wheat variety introduced by PAU (27% increase), wheat varieties suitable for chapati making (27% increase), and knowledge about the happy seeder (22% increase). Additionally, there were notable improvements in identifying late-sown varieties (25% increase), understanding the timing of wheat sowing (20% increase), and recognizing the timing of wheat harvesting (20% increase). Despite a lower initial awareness, there was a substantial 20% increase in correctly identifying the most common disease of wheat. The mean percentage increase in knowledge was an impressive 103%, highlighting the effectiveness of the educational program in enhancing farmers' understanding of wheat cultivation practices. These findings emphasize the importance of targeted educational initiatives in promoting sustainable agriculture and improving farmers' livelihoods. Continued support and education efforts are vital to sustain and build upon these positive outcomes (Table 1).

These findings provide valuable insights into the socio-profile and agricultural landscape of the surveyed region, offering a nuanced understanding of the challenges and opportunities facing farming communities. The data underscore the importance of holistic and context-specific approaches to agricultural development and policy formulation, aimed at enhancing agricultural productivity, promoting sustainable livelihoods, and ensuring food security for rural populations.

4.2 Preference of Wheat Varieties

In the context of the survey, the result regarding variety preferences and adoption reveals a notable trend among farmers wherein a portion of them rely on using seeds from the previous year's harvest for sowing in the subsequent year. Additionally, some farmers demonstrate awareness of newly released varieties, indicating a potential for varietal adoption and innovation within the farming community. The practice of using seeds from the previous year's harvest for the next year's sowing reflects a form of traditional seed-saving behavior among farmers. This practice may stem from various factors such as cost considerations, familiarity with local seed varieties, and perceived seed quality. Conversely, the awareness of newly released varieties among some farmers suggests openness to innovation and adoption of modern agricultural technologies (Fig. 12). These farmers demonstrate receptivity to external knowledge sources, including agricultural extension services, research institutions, and input suppliers, which promote the dissemination of improved seed varieties and agronomic practices. The willingness of these farmers to explore and adopt new varieties underscores their interest in enhancing crop productivity, profitability, and resilience to biotic and abiotic stresses.

Table 1. Distribution of respondents according to gain in knowledge regarding seed treatment after watching video

(Participants=60)

Questionnaire	Before	After
1. Which of the following has the higher concentration of zinc? (PBW Zn 2)	3(5%)	18(30%)
2. Which is the latest variety of wheat Introduced by PAU? (PBW 826)	12(20%)	28(47%)
3. Which variety is good for chapati making? (PBW 1 Chapati)	7(12%)	23(38%)
4. Do you know about happy seeder?	7(11.6%)	20(33%)
5. How much seed is for variety Unnat PBW 550 while using Happy seeder? (50kg/acre)	0	13(22%)
6. Which of the following varieties is late sown variety? (PBW 757)	1(2%)	16(27%)
7. What are the special characters present in the variety PBW 1 chapati? (a) Chapati made from it is whitish in color. (b) Chapati tastes sweet. (c) Chapati remains soft even after hours of cooking. (d) **All of the above**	0	17(28%)
8. In which month is wheat sown? (Nov.)	40(67%)	52(87%)
9. In which month is wheat harvested? (April)	41(68%)	53(88%)
10. Most common disease of wheat? (Yellow and brown rust)	25(42%)	37(62%)
Mean	2	5
MEAN%	23%	46%
SD	8	11
% Change	103	

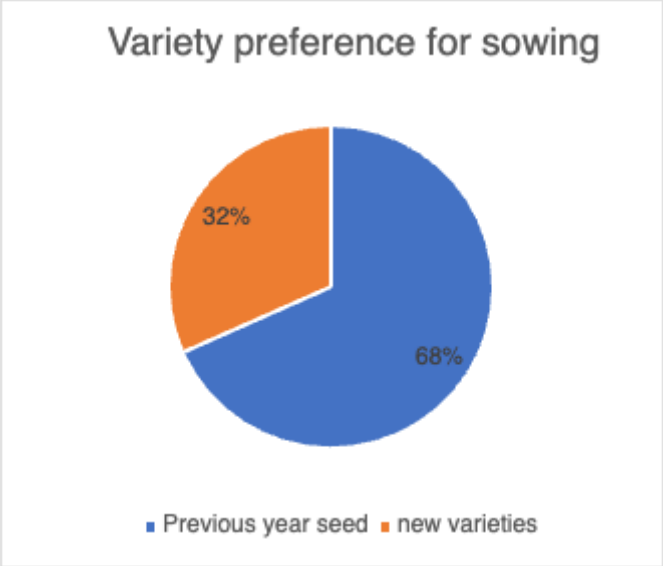

Fig. 12. Pie chart showing Variety preference for sowing

5. CONCLUSION

In conclusion, the cross-sectional survey conducted in five rural villages of the Punjab region provided a comprehensive understanding of the socio-profile status, agricultural practices, and knowledge dynamics among farmers. The demographic profile revealed a balanced gender distribution, a predominantly mature farming population, and a mix of educational backgrounds and farming experience levels. The high prevalence of smartphone usage and reliance on peer networks and progressive farmers for agricultural information highlighted the evolving technological landscape and the importance of social networks in knowledge dissemination.

The diversity in landholding patterns underscored the need for targeted support mechanisms,

acknowledging the varied socio-profile landscape within the farming community. The preference for traditional seed-saving practices and the simultaneous awareness of newly released varieties indicated a nuanced approach to crop management, blending traditional wisdom with openness to innovation. The video presentation on wheat varieties demonstrated a positive impact on farmers' knowledge, showcasing the effectiveness of multimedia approaches in agricultural extension. However, the persistent preference for previous year's seeds suggested the importance of addressing factors beyond knowledge dissemination, such as seed availability, cost considerations, and farmer preferences.

The notable increase in knowledge observed among farmers after video presentations on wheat varieties highlights the efficacy of multimedia approaches in agricultural extension and education. However, the preference for sowing previous year's seeds over newly released varieties indicates the persistence of traditional practices and the need for targeted interventions to promote varietal adoption and innovation.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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