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Insect pest management in paddy and sociodemographic profile of agricultural practitioners within the SAS Nagar, India

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Abstract

The study conducted in five villages of SAS Nagar, Mohali area- Sahauran, Hasanpur, Radiala, Ghataur, Allahpur districts of Punjab, India examines the socio-economic profile of farmers. The aim is to gain insights into the challenges and opportunities in the agricultural sector. The study covers various aspects of farmers lives such as age distribution, education levels, access to technology, family structure, land holdings and sources of information. It emphasizes on insect pest management in paddy fields utilizing a questionnaire and video, farmers comprehension and knowledge retention were assessed before and after video viewing. In Punjab common pests like rice stem borers, rice hispas, brown plant hoppers pose challenges. Farmers employ various practices, including monitoring, biological control agents, training, selective chemical application and timely intervention. Challenges persist, including rising input costs, labour shortages, limited access to pest control products, and climate change impacts. Land holdings vary from less than 1 hectare to over 10 hectares, with most farmers owning between 2 and 10 hectares. Input dealers and co-operative societies are significant sources of information for farmers. Moreover, the availability of essential cards such as Aadhar and ration cards varies among farmers. The results highlight the importance of addressing educational disparities, bridging digital divides, and enhancing access to information for farmers. This would help improve agricultural practices and overall well-being in the region.

Keywords: Land holdings, family structure, questionnaire, educational and agricultural practices

Introduction

Agriculture plays a crucial role in India's economy, with over 50% of the population making a living from it. The sector provides raw materials for various other industries and contributes significantly to the country's GDP. Therefore, improving agricultural practices is crucial to increase the country's agricultural productivity and promote economic growth. Providing quality education to impoverished and rural communities is also vital to India's social and economic progress.

Rice cultivation in Punjab has experienced remarkable growth and productivity over the past 45 years, leading to the state being recognized as the "Rice Bowl of India." Since the Green Revolution in the 1960s, Punjab has made significant strides in rice cultivation, contributing substantially to India's overall rice production. The adoption of high-yielding varieties and modern agricultural practices has been pivotal in Punjab's success story in rice [3].

Rice holds a crucial position in India's agricultural landscape, covering a quarter of the total cropped area and providing sustenance to nearly half of the Indian population. Punjab's progress in rice productivity can be attributed to its adoption of high-yielding varieties and advanced agricultural techniques. The state's success in rice cultivation has not only boosted its own agricultural output but has also significantly impacted India's rice production on a national scale [1].

The adaptability of rice cultivation in Punjab is evident through its growth under diverse soil and climatic conditions. From below sea level areas like Kuttanad in Kerala to elevations reaching 2000 meters in regions like Jammu & Kashmir, Himachal Pradesh, and the North-Eastern Hills, rice crops thrive across a wide range of environments.

This adaptability underscores the resilience and extensive cultivation potential of rice across various terrains and climates [2].

Despite these achievements, rice cultivation in Punjab faces challenges such as pest infestations, especially after floods, leading to issues like ineffective sprays and labor shortages [8]. To address these challenges sustainably, Integrated Pest Management (IPM) practices play a crucial role by emphasizing regular monitoring, optimal pesticide use research, and the integration of bio-based approaches for effective pest management [6].

Our central focus was on addressing insect pests in paddy fields we employed a questionnaire and video actively involve farmers, evaluating their comprehension both before and after viewing the instructional video. This methodology enabled us to gauge the farmers understanding of insect pest management in paddy cultivation. In the region of Punjab, farmers grapple with challenges posed by prevalent pests such as rice stem borer, rice hispas and brown plant hoppers [5]. In response to these challenges, Punjabi farmers adopt a range of practices including visual inspections, sampling techniques, the introduction of biological control agents, participation in Farmer Field Schools for integrated Pest management practices, selective application of insecticides based on Economic Threshold Levels and strategic interventions for maximum effectiveness [9].

Materials and Methods

In the RAWE program, we developed a questionnaire and video focusing on insect pest management in paddy fields. We engaged farmers by posing questions before and after they viewed the video. This approach allowed us to assess their comprehension and knowledge retention regarding insect pest management in paddy cultivation. The socio-economic status of farmers in the SAS Nagar, districts of Punjab, India, provides a comprehensive view of their living conditions, access to resources, and overall well-being. By analysing data collected from villages, Hasanpur, Radiala, Ghataur, Allahpur, Soharaun, crucial insights into various aspects of the farmers' lives, including age distribution, education levels, access to technology, family structure, land holdings, and sources of information, are obtained. The study locale was selected based on the representativeness of the district's agricultural practices and the diversity in landholding sizes. The research was conducted in three villages within the SAS Nagar district of Punjab, located in the northeastern part of the state. The selection of these villages ensures that the findings can be contextualized within the broader district context while capturing potential variations within it. This study locale allowed for a comprehensive exploration of the socio-economic landscape and well-being of farmers in the SAS Nagar district of Punjab. The non-experimental, descriptive research design enabled the observation and characterization of complex relationships between independent and dependent variables, while the selection of representative villages enabled contextualization within the broader district context.

Hasanpur village is a significant rural community located in the Kharar tehsil of Sahibzada Ajit Singh Nagar district in Punjab, India. The village has a total geographical area of 172 hectares, and its demographic and socio-economic profile has been updated using the latest available data. It is situated 16 km from the sub-district headquarter Kharar and 12 km from the district headquarter Sahibzada Ajit Singh Nagar. According to the 2011 Census, the village code is 039040, and it falls under the governance of the Hasanpur gram panchayat. The village has a

total population of 961, with 518 males and 443 females. The literacy rate stands at 79.71%, with 82.43% of males and 76.52% of females being literate. The village has approximately 175 houses, and its pin code is 140103. Kurali is the nearest town for major economic activities [4].

Radiala

A village located within the Kharar tehsil of Punjab's Sahibzada Ajit Singh Nagar district, is a community that is undergoing a transformation while still retaining its traditional roots. The village is situated approximately 19 kilometers from the Kharar sub-district headquarters and 23 kilometers from the district headquarters, covering a total land area of 297 hectares. While the 2011 census provides a historical perspective, it is essential to provide an up-to-date picture of Radiala in 2024 [7].

Ghataur

Ghataur is home to 1,453 people who embody a vibrant rural spirit. Agriculture remains the main source of income, with wheat and paddy being the primary crops. Despite 75.2% of the population being literate, the gender gap in literacy is still a concern.

The village is known for its strong community spirit and traditional values. However, with the nearby IT hub of SAS Nagar, social interactions are changing, and it remains to be seen how this will affect the aspirations of future generations. Ghataur must navigate the challenges of diversifying its economy, addressing the gender gap in literacy, and adapting to the changing social landscape while preserving its unique identity.

Allahpur

Allahpur, with a population of 1,023, shares similar economic realities with Ghataur, with agriculture remaining a dominant industry. However, the literacy rate is slightly lower, standing at 73.4%, with a higher disparity between male and female literacy rates.

Like Ghataur, Allahpur has a strong sense of community and traditional values. With the advent of the nearby IT hub, social interactions are changing, and further exploration is needed to understand how this will affect the aspirations of future generations. Allahpur's future depends on achieving sustainable economic diversification, bridging the literacy gap, and proactively addressing the challenges posed by the changing social landscape.

Soharaun

Soharaun, with a population of 1,284, is a unique blend of agriculture, animal husbandry, and small-scale industries. This diversification has resulted in a slightly higher literacy rate of 76.9%, but the gender gap remains an issue.

Soharaun's strong Punjabi identity is evident, while its social fabric is undergoing changes driven by education and technology. Understanding how these factors influence intergenerational dynamics and cultural preservation is crucial. Soharaun's progress hinges on modernizing its agricultural practices, creating job opportunities for its youth, and ensuring the harmonious integration of technological advancements while safeguarding its rich cultural heritage.

Primary data collection for this study involved administering questionnaires based on interviews conducted with 60 farmers. The questionnaire was developed through pre-structured sessions aimed at aligning with the study's objectives. Percentages have been included alongside the recorded data to

enhance comprehension, calculated using relevant formulas.

$$\text{Percentage (\%)} = N / n * 100$$

where,

N = total no. of respondents from all the 5 villages i.e., 60 respondents.

n = the no. of respondents from each village.

Results and Declarations

The survey revealed that 20, 25, 30, 35 overall percentage of the respondents is 8.83% of G1, G2, G3, G4 respectively were in the age group of 35, 40, 45, 50 percentage of respondents is 23% of G1, G2, G3, G4 respectively were in the age group of 50, 55, 60, 65 overall percentage of respondents is 23.3% of G1, G2, G3, G4 and respectively were in the age group of 65-80 years overall percentage of respondents is 35%.

Table 1: Age Category

S.No.	Parameters	Hasanpur n=13	Sahauran n=12	Radiala n=13	Ghataur n=12	Allahpur n=10	Overall % n=60
1.	20-35	1	2	0	1	1	8.83%
2.	35-50	2	5	1	2	4	23%
3.	50-65	3	5	2	1	3	23.3%
4.	65-80	6	4	4	2	5	35%

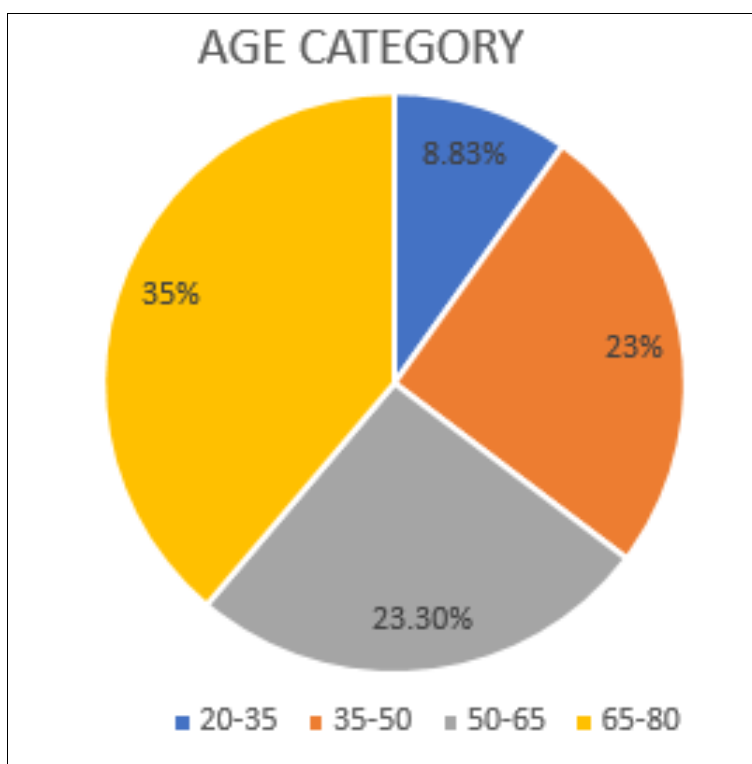


Fig 1: Represents the age category

Head of the family

The head of a village or community plays a pivotal role in leadership and decision-making within that locality. The role of the head of the family is crucial as they serve as the primary caregiver and decision-maker within the household. In a recent survey conducted in five villages, data was collected on three

categories of family heads: self, father, and mother. The results indicated that self accounted for 28.3%, father for 43.3%, and mother for 2% of the total, with fathers being the most common family heads across the villages. This underscores the significant responsibility fathers hold in leading their families and making important decisions within the farming communities.

Table 2: Head of the Family

S.No.	Parameters	Hasanpur n=13	Sahauran n=12	Radiala n=13	Ghataur n=12	Allahpur n=10	Overall % n= 60
1.	SELF	5	3	1	2	6	28.3%
2.	FATHER	13	3	6	1	3	43.3%
3.	MOTHER	3	2	5	1	1	2%

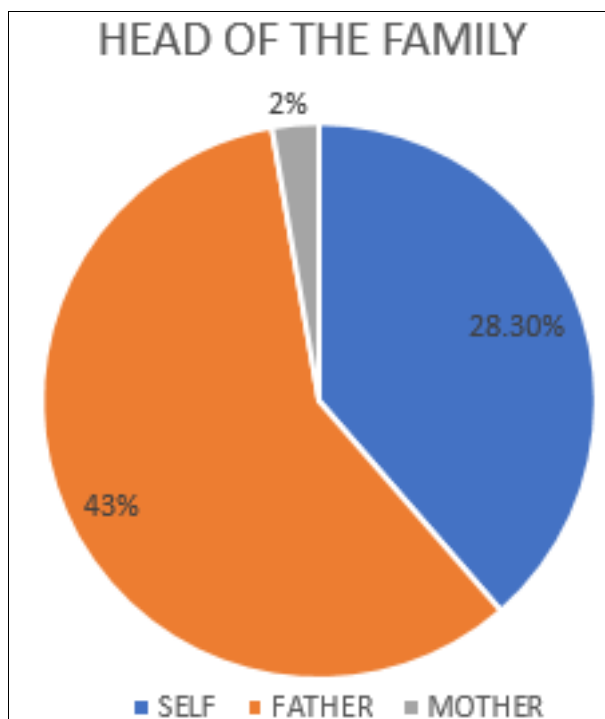


Fig 2: Represents the Head of the family

Land Holding Information

Leasing agricultural land holdings by a farmer provides insights into the scale of their operations and their position within the regional agricultural economy. The extent to which a farmer engages in leasing activities offers valuable information about resource management dynamics and land utilization practices

within the farming community. As indicated in the provided Table and Figure, 41.6% of farmers lease in land, while 23.3% lease out their land. Additionally, 36.6% of farmers own the land they operate on, highlighting the diverse approaches to land tenure and management among farmers.

Table 3: Land Holding Information

S.No.	Parameters	Hasanpur n=13	Sahauran n=12	Radiala n=13	Ghataur n=12	Allahpur n=10	Overall % n= 60
1.	OWNED	6	4	7	3	2	36.6%
2.	LEASED IN	4	5	8	5	3	41.6%
3.	LEASED OUT	3	2	1	4	4	23.3%

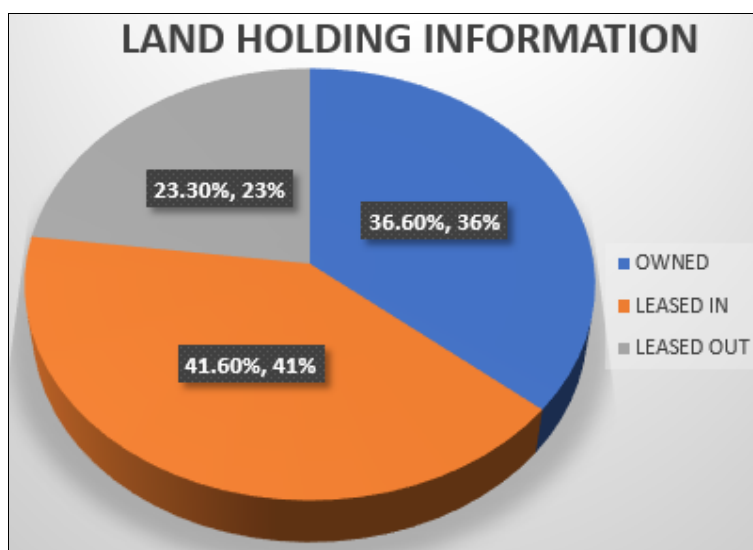


Fig 3: Represents the Land Holding Information

Educational Qualification

In a survey conducted across five villages, it was found that among 60 farmers, 25% were illiterate, 23.3% had primary education, 18.3% had secondary education, and only 3% had graduated. Over time, there has been a positive trend where

people are motivating the next generation to pursue education. The significance of education for farmers as it enhances agricultural productivity, knowledge, and decision-making skills. Education plays a pivotal role in introducing modern farming techniques and technologies to improve efficiency and

productivity in agricultural activities. The study emphasized the importance of education for farmers as it enhances agricultural productivity and knowledge, leading to improved decision-making and efficiency in farming

activities. Education plays a crucial role in opening up new opportunities for farmers and helps in adopting modern farming techniques and technologies for increased productivity and income generation.

Table 4: Educational Qualification

S.No.	Parameters	Hasanpur n=13	Sahauran n=12	Radiala n=13	Ghataur n=12	Allahpur n=10	Overall % n= 60
1.	ILLITERATE	3	2	4	3	3	25%
2.	PRIMARY	4	2	4	3	1	23.3%
3.	SECONDARY	1	2	3	3	2	18.3%
4.	GRADUATE	1	0	2	1	0	3%

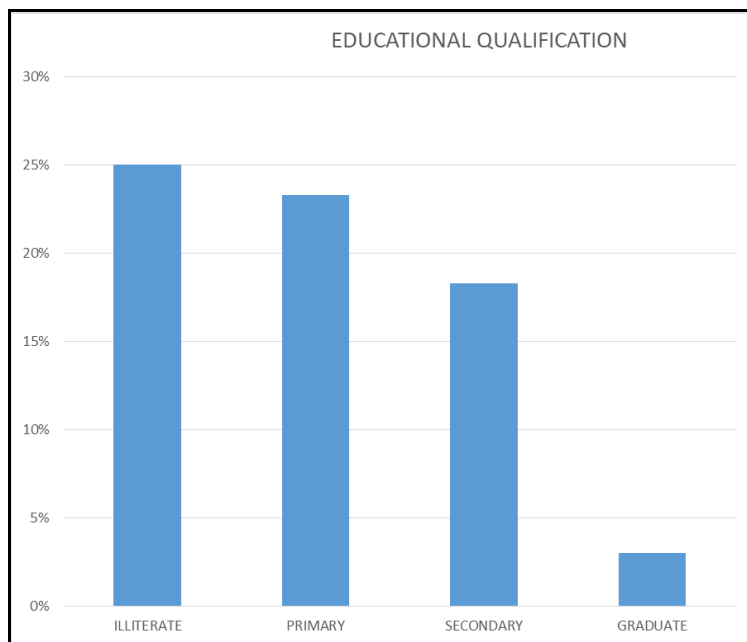


Fig 4: Represents the Educational Qualification

Family Composition

The survey also revealed that most of the families in the villages were nuclear families, with only a small percentage living in

joint families. The percentage of nuclear families was 66.6%, while the percentage of joint families was 18.3%

Table 5: Family Composition

S.No.	Parameters	Hasanpur n=13	Sahauran n=12	Radiala n=13	Ghataur n=12	Allahpur n=10	Overall % n= 60
1.	JOINT	3	2	3	1	2	18.3%
2.	NUCLEAR	5	7	11	8	9	66.6%

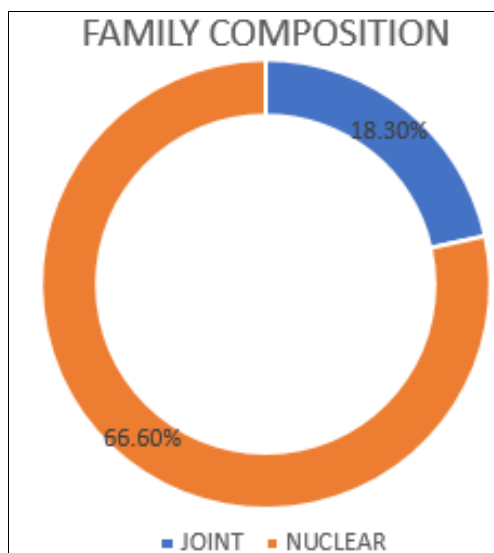


Fig 5: Represents the Family Composition

Source of Information

Farmers rely on various sources of information to acquire knowledge and learn new farming techniques. The data from the survey indicates that 68.3% of farmers are aware of logs, 11.6% refer to newspapers, 25% participate in farmer's fairs, 0.01% utilize farmer's call centers, 0.1% consult progressive farmers, 41% seek advice from friends, and 0.5% engage in group meetings. These diverse sources play a crucial role in disseminating information and enhancing farmers' understanding of agricultural practices and innovations. Understanding the

preferences of farmers regarding information sources is crucial for designing effective agricultural extension programs. Neighbor-friends-relatives are commonly ranked as the primary source of information by farmers, highlighting the importance of informal networks in knowledge sharing. Additionally, company dealers and print media play significant roles in providing agricultural information to rural farmers, emphasizing the diverse range of sources utilized by farmers to enhance their farming practices.

Table 6: Source of Information

S. No.	Parameters	Hasanpur n=13	Sahauran n=12	Radiala n=13	Ghataur n=12	Allahpur n=10	Overall % n= 60
1.	Radio/TV	10	11	8	5	7	68.3%
2.	Newspaper	2	1	3	1	0	11.6%
3.	Kisan Mela	3	5	2	4	1	25%
4.	Kisan Call Centre	0	0	1	0	0	0.01%
5.	NGO	0	0	0	0	0	0
6.	Progressive Farmer	2	1	1	1	2	0.1%
7.	Friends/Relatives	5	4	3	7	6	41%
8.	Group Meeting	8	7	4	6	5	0.5%

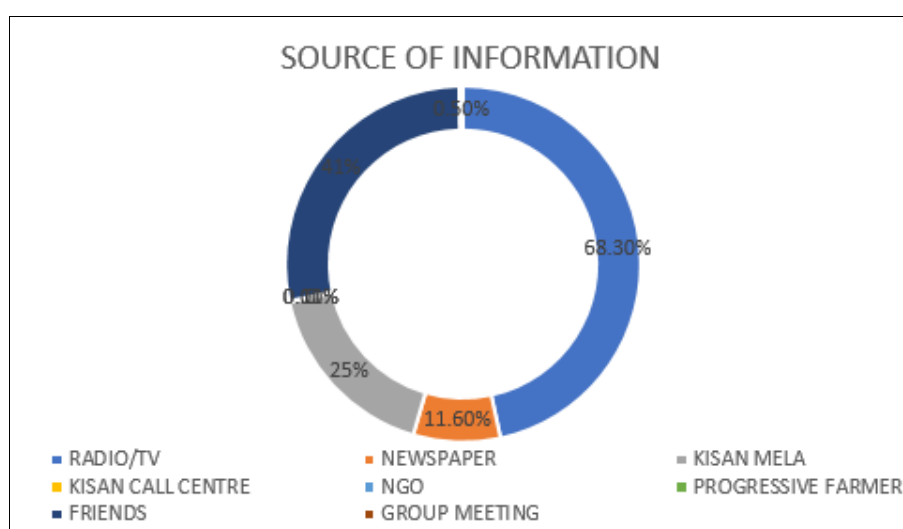


Fig 6: Represents the Source of Information

Extension Contact

Farmers rely on various sources of information and extension contacts to manage their crops and improve productivity. Among the surveyed population, 33.3% of farmers utilize the state agricultural university as a source of information, while 0.3% consult the department of agriculture and 0.2% engage with agriculture science centers. Additionally, private agencies have been a significant source of guidance for 23.3% of farmers,

indicating the diverse range of resources farmers leverage to enhance their agricultural practices. Farmers utilize a variety of sources to access information and guidance for their agricultural practices. These sources include state agricultural universities, departments of agriculture, agriculture science centers, and private agencies, highlighting the importance of diverse and accessible resources for farmers to improve their operations and productivity.

Table 7: Extension Contact

S. No.	Parameters	Hasanpur n=13	Sahauran n=12	Radiala n=13	Ghataur n=12	Allahpur n=10	Overall % n= 60
1.	State agricultural university	3	2	5	6	4	33.3%
2.	Department of agriculture	5	3	7	2	1	0.3%
3.	KVK	1	3	2	1	5	0.2%
4.	Private Agencies	4	2	1	3	4	23.3%

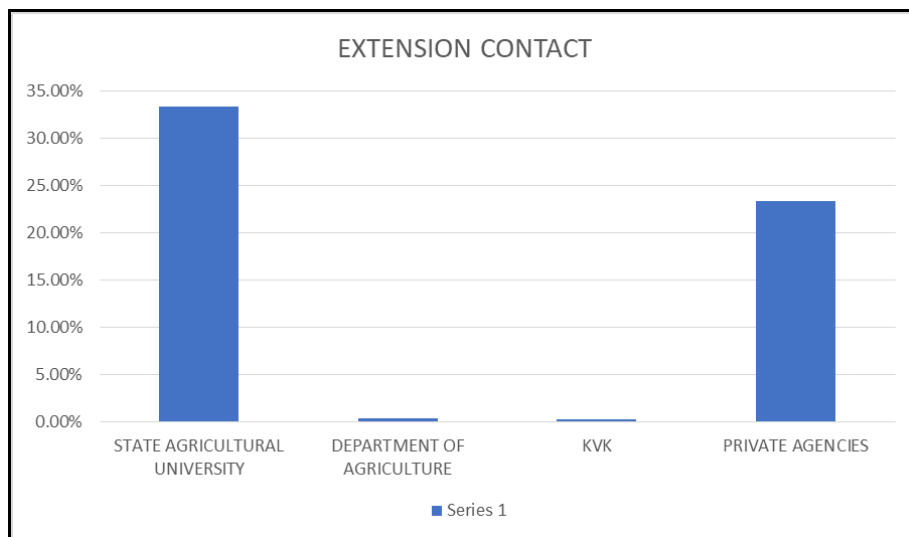


Fig 7: Represents the Extension Contact

Livestock Information

Farmers manage their livestock and improve productivity. Among the surveyed population, 65% of farmers utilize cow and buffalo as their primary livestock, with 56.6% specifically focusing on cow or buffalo. Additionally, the income of people is known because few people are making their products, selling milk or milk in dairy also provides a source of income, which is also a hope

.Cow and buffalo are the most common livestock species in the surveyed population, highlighting their significance in the farming community. These animals play a crucial role in the

agricultural economy, contributing to milk production and other dairy products. By leveraging the resources available for cow and buffalo management, farmers can optimize their livestock operations and enhance their overall productivity .The income generated from selling milk or milk products in dairy also provides a significant source of income for farmers. This income stream is a hope for many farmers, as it contributes to their overall financial stability and well-being. By focusing on dairy production and marketing, farmers can capitalize on this income source and improve their livelihoods.

Table 8: Livestock Information

S.No.	Parameters	Hasanpur n=13	Sahauran n=12	Radiala n=13	Ghataur n=12	Allahpur n=10	Overall % n= 60
1.	COW	7	8	10	5	9	65%
2.	BUFFALO	5	7	4	8	10	56.6%

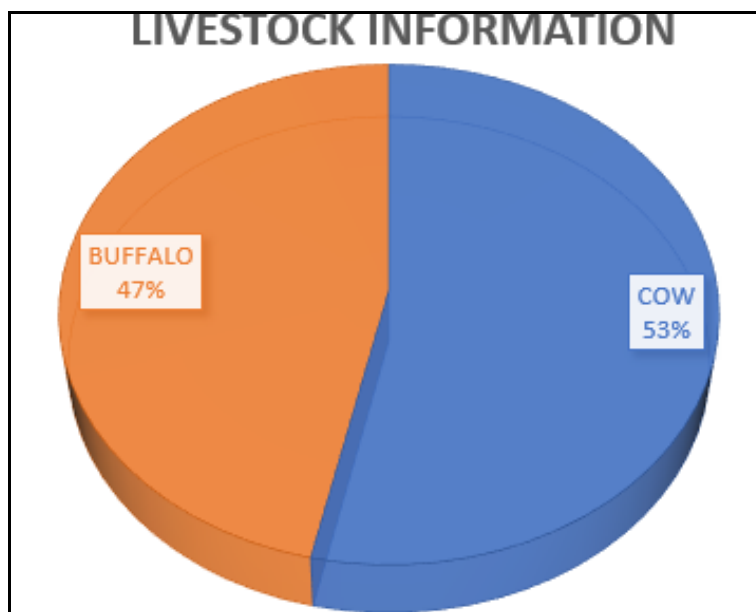


Fig 8: Represents the Livestock Information

Schemes

Farmers utilize various government schemes to meet their needs and enhance their businesses. These schemes, launched by the government, aim to support farmers in different aspects. Among the surveyed population, 26.6% of people are utilizing a specific

government scheme, while nearly all individuals have access to and use Aadhaar cards (65%) and ration cards (50%). The data reveals a significant uptake of these schemes among the surveyed population, indicating a widespread utilization of these resources to meet their requirements and benefit their

businesses. Access to government schemes and identification tools like Aadhaar cards and ration cards is crucial for farmers to avail themselves of benefits and support provided by the government. These schemes play a vital role in enhancing the livelihoods of farmers and ensuring their participation in various

agricultural programs. By leveraging these resources effectively, farmers can improve their access to essential services and opportunities that contribute to the growth and sustainability of their agricultural activities

Table 9: Schemes

S.No.	Parameters	Hasanpur n=13	Sahauran n=12	Radiala n=13	Ghataur n=12	Allahpur n=10	Overall % n= 60
1.	GOVERNMENT SCHEME	3	5	4	2	2	26.6%
2.	RATION CARD	7	8	9	5	10	65%
3.	AADHAR CARD	13	12	13	12	9	50%

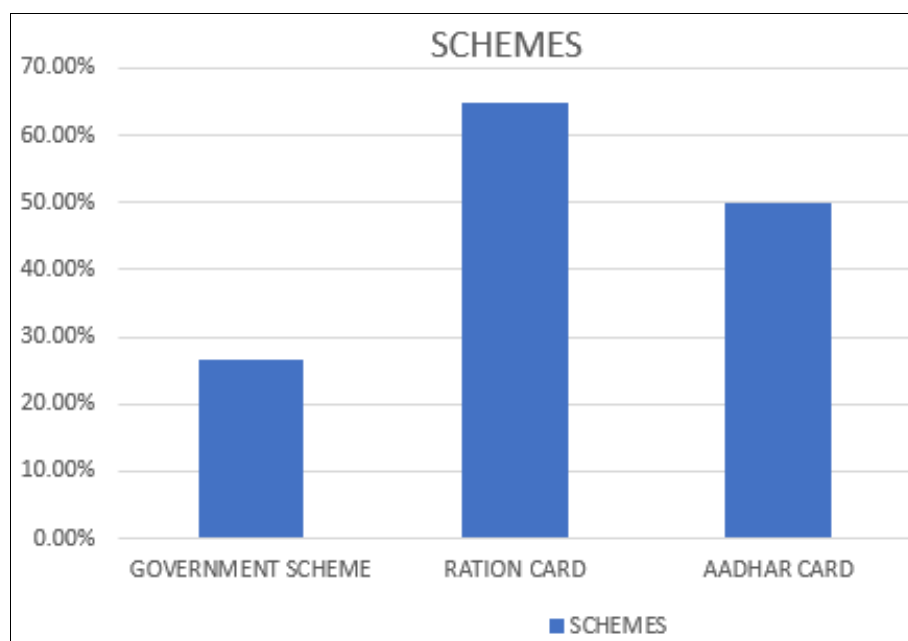


Fig 9: Represents the Schemes

Video Questionnaire

In the survey, we created a video for farmers to assess their knowledge. We administered a questionnaire both before and after they watched the video to gauge their awareness levels. The data revealed that the average percentage of knowledge before viewing the video was 77%, which increased to 86.56% after watching it. This indicates a significant improvement in understanding among the farmers post-viewing. The video effectively enhanced awareness levels regarding its content among the surveyed participants. The video content created for

farmers plays a crucial role in enhancing their understanding and knowledge. By utilizing visual media, such as videos, farmers are more likely to engage with the information presented, leading to increased awareness and comprehension. The visual appeal of videos attracts farmers and stimulates their interest, making them more receptive to the content shared. This approach effectively conveys information and creates awareness among farmers about various agricultural practices and innovations.

Table 10: Video Questionnaire

Questionnaire	Before	After
Common symptom of rice hispa infestation?	75% (45)	91.67% (55)
What is the primary colour adult rice hispa?	83.33% (50)	96.67% (58)
Effective method for managing rice hispa?	63.33% (38)	80% (48)
Which chemical is used to control rice hispa?	70% (42)	83.33% (50)
Recommended quantity of Ekalux used to control rice hispa?	91.67% (55)	100% (60)
Common symptoms caused by stem borer infestation?	80% (48)	91.76% (55)
What type of damage does rice stem borer cause to the rice plant?	66.67% (40)	86.67% (52)
Which stage of the rice stem borer causes direct damage to the rice plant?	86.67% (52)	96.97% (58)
Which month is rice most susceptible to rice stem borer infestation?	58.33% (35)	75% (45)
10. Coragen insecticide is commonly used to control which pests in rice fields?	78.33% (47)	90% (54)
Primary damage caused by leaf folder in rice crops?	88.33% (53)	98.33% (59)
Which month is most susceptible to leaf folder infestation?	61.67% (37)	81.67% (49)
Which one is Known for attacking rice crops causing damage to both leaves and stems?	73.33% (44)	88.33% (53)
Which month is most susceptible to plant hopper infestation?	81.67% (49)	93.33% (56)
Common symptom of plant hopper infestation?	60% (36)	76.67% (46)
Which insecticide is used to control leaf folder infestation?	85% (51)	95% (57)

Which insecticide is used to control plant hopper in rice fields?	65% (39)	85% (51)
18. Damaging stage of rice hispa is?	76.67% (46)	91.67% (55)
Percentage Correct	82% (820/1000)	93.5% (935/1000)
Mean Value	45.56	51.94
Mean Percentage	77% (45.56/60)	86.56% (51.94/60)

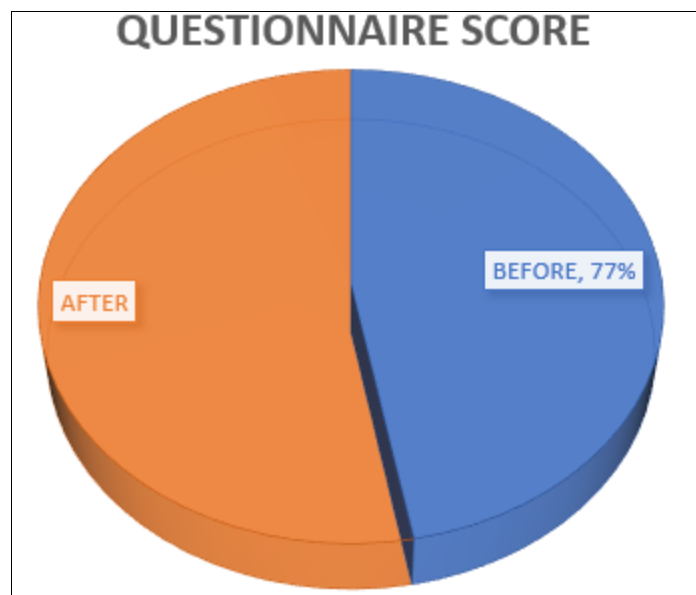


Fig 10: Represents the Video Questionnaire

Research findings suggest a notable disparity in farmers' knowledge levels before and after engaging with insect pest management in paddy fields. The studies underscore the significance of equipping farmers with insights into insect pests to mitigate pesticide misuse and promote eco-friendly practices. Training initiatives focusing on integrated pest management play a pivotal role in enriching farmers' comprehension of pesticide risks and fostering sustainable pest control methods.

Moreover, research highlights a strong link between farmers' knowledge and their implementation of pest management practices, emphasizing the importance of adequate knowledge and suitable practices to minimize the negative impacts of pesticides in agriculture.

Overall, these studies emphasize the positive influence of educational interventions on farmers' knowledge and practices concerning insect pest management in paddy fields.

Conclusion

Agriculture, along with its related sectors, undeniably stands as the primary source of livelihood in India, particularly in the extensive rural regions. Furthermore, it makes a substantial contribution to the Gross Domestic Product (GDP). Sustainable agricultural practices, encompassing food security, rural employment, and environmentally friendly technologies like soil conservation, sustainable natural resource management, and biodiversity protection, are imperative for comprehensive rural development. The agricultural landscape in India has witnessed significant transformations known as the green revolution, white revolution, yellow revolution, and blue revolution. The study conducted in five villages of SAS Nagar, Mohali area, Punjab, India, examines the socio-economic profile of farmers. The aim is to gain insights into the challenges and opportunities in the agricultural sector. The study covers various aspects of farmers' lives such as age distribution, education levels, access to technology, family structure, land holdings, and sources of information. Rice holds a crucial position in India's agricultural

landscape, covering a quarter of the total cropped area and providing sustenance to nearly half of the Indian population. Punjab's progress in rice productivity can be attributed to its adoption of high-yielding varieties and advanced agricultural techniques. The state's success in rice cultivation has not only boosted its own agricultural output but has also significantly impacted India's rice production on a national scale. We developed a questionnaire and video focusing on insect pest management in paddy fields. We engaged farmers by posing questions before and after they viewed the video. This approach allowed us to assess their comprehension and knowledge retention regarding insect pest management in paddy cultivation.

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