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Temporal trends in training participation and technology adoption among KVK trainees of district S.A.S. Nagar

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Abstract

The present study evaluates the performance of Krishi Vigyan Kendra (KVK) training programmes with specific emphasis on participation trends, discipline-wise diversification, and enterprise adoption outcomes. Using six years of institutional data (2018-2024) from KVK S.A.S. Nagar, Punjab, the study analyses growth in training courses, inclusivity of women, rural youth, and SC/ST participants, and the extent of adoption of recommended technologies across agriculture and allied sectors. Descriptive statistical tools were employed to examine year-wise and discipline-wise participation patterns, while adoption behaviour was assessed through categorisation into full, partial, and non-adoption. The results reveal a consistent increase in training intensity and inclusiveness, with women constituting nearly 40% and SC/ST participants averaging 25% of total trainees. Discipline-wise analysis indicates a gradual shift from conventional crop production toward livestock, horticulture, fisheries, and home science enterprises. Adoption analysis demonstrates that practices with lower capital requirements and immediate economic returns-such as paddy residue management (100%), clean milk production (80%), backyard poultry (71%), and bakery-based enterprises (72%) exhibited significantly higher full adoption rates. In contrast, capital-intensive and technically complex enterprises such as protected cultivation and advanced aquaculture systems showed higher partial or non-adoption. The findings confirm that KVK trainings are most effective when technological recommendations align with local resource availability, market access, and institutional support. The study underscores the importance of adoption-oriented training design and continuous advisory support to enhance the long-term impact of extension interventions.

Keywords: Krishi Vigyan Kendra, training effectiveness, adoption behaviour, rural youth, women empowerment, agricultural extension

Introduction

Krishi Vigyan Kendras (KVKs) function as frontline agricultural extension institutions with the mandate of transferring location-specific technologies from research systems to farmers through vocational training, demonstrations, and advisory services. Established under the Indian Council of Agricultural Research (ICAR), KVKs are designed to reduce the research-extension-farmer gap by strengthening technical competence and skill orientation among farming communities, rural youth, and farm women (Ahmad *et al*., 2012; Dubey *et al*., 2008) [1, 3]. Over time, KVKs have expanded their scope beyond crop production to encompass livestock, horticulture, fisheries, home science, and enterprise development, thereby contributing to livelihood diversification and rural development.

A substantial body of extension research confirms that KVK training programmes positively influence trainees' knowledge, attitudes, and skills. Perception-based assessments have shown high satisfaction levels with training quality, relevance, and instructional methods, particularly for demonstration-oriented programmes (Senthilkumar *et al*., 2014; Karak & Mukhopadhyay, 2020) [12, 5]. Similarly, studies across different agro-ecological regions have documented improvements in productivity, income, preparedness for agricultural operations, and socio-economic status following participation in KVK trainings (Panwar *et al*., 2017; Subbaiah, 2024; Tiwari *et al*., 2024) [6, 13, 14]. However, these outcomes do not uniformly translate into sustained field-level practice.

In extension research, adoption of recommended practices is widely regarded as the most reliable indicator of training effectiveness, as knowledge acquisition alone does not guarantee behavioural change. Earlier studies have reported that adoption levels among KVK trainees vary significantly across technologies and enterprises, influenced by factors such as cost of adoption, perceived risk, availability of inputs, and expected economic returns (Ajrawat *et al*., 2013; Jiyawan *et al*., 2012) [2, 4]. Technologies requiring lower capital investment and offering immediate economic benefits tend to achieve higher and faster adoption, whereas complex and capital-intensive innovations often exhibit partial or delayed uptake despite adequate training exposure (Selvi & Balasubramaniam, 2019) [11].

Women-centric and group-based interventions implemented through KVKs have shown comparatively higher adoption outcomes due to collective participation, shared risk, and market linkage support. Empirical evidence indicates that home science-based enterprises, food processing, and value addition activities promoted through self-help groups result in improved income generation, decision-making ability, and sustained adoption among rural women (Panwar *et al*., 2017; Raghavendra & Gowda, 2018; Sahu *et al*., 2024) [6, 7,

[9]. Similarly, rural youth demonstrate higher adoption of skill-oriented and enterprise-based trainings such as poultry farming, protected cultivation, and modern aquaculture when these are aligned with entrepreneurship opportunities (Karak & Mukhopadhyay, 2020; Raut *et al*., 2023) [5, 8].

Despite extensive documentation on participation and perceived effectiveness, systematic integration of adoption metrics with long-term training data remains limited, particularly at the district level. Punjab's agriculture, characterized by intensive cropping systems and emerging diversification pressures, requires evidence-based extension strategies that emphasize not only training coverage but also post-training adoption behaviour. Against this backdrop, the present study evaluates six years (2018-2024) of KVK training data from S.A.S. Nagar district, with a specific focus on participation trends, discipline-wise diversification, and enterprise-level adoption outcomes. By categorizing adoption into full, partial, and non-adoption, the study provides a comprehensive assessment of how KVK trainings translate into practical implementation, thereby offering insights for strengthening adoption-oriented extension planning.

Materials and Methods

Study Area

The present study was conducted at the Krishi Vigyan Kendra (KVK), Sahibzada Ajit Singh (S.A.S.) Nagar district, Punjab, India. Geographically, S.A.S. Nagar lies in the north-eastern part of Punjab between approximately 30.5°-31.1° N latitude and 76.4°-76.9° E longitude, adjoining the Union Territory of Chandigarh. The district forms part of the sub-mountainous and central plain agro-ecological zone of Punjab and represents a transitional interface between peri-urban and rural production systems. The altitude ranges from about 300 to 365 m above mean sea level, with gently undulating topography.

Climatically, the district falls under a subtropical semi-arid climate, characterized by hot summers, cold winters, and a monsoon-dominated rainfall pattern. The mean annual rainfall ranges between 900 and 1,000 mm, the majority of which is received during the southwest monsoon (July-September). The agro-climatic conditions support diversified farming systems including cereal-based cropping, horticulture, livestock rearing, fisheries, and emerging peri-urban enterprises such as protected cultivation and value addition. Soils are predominantly alluvial to loamy in texture, with moderate fertility and good irrigation coverage through canal and tube well systems.

Administratively, S.A.S. Nagar district comprises four development blocks-Mohali, Kharar, Dera Bassi, and Majri-with a total of approximately 380 villages. The district exhibits relatively high literacy levels compared to the state average, along with substantial exposure to urban markets due to proximity to Chandigarh. Agriculture and allied activities continue to provide livelihood support to a significant proportion of the rural population, although increasing participation of rural youth in non-farm and semi-farm enterprises has been observed. These socio-economic characteristics make the district a suitable setting for evaluating training outreach, diversification, and adoption behaviour under KVK interventions.

Data Source and Study Design

The study is based on secondary data collected from official training records maintained at KVK S.A.S. Nagar for a six-year period from 2018-19 to 2023-24. The dataset included information on the number of training programmes conducted annually, total participants, women participants, SC/ST participants, and rural youth participants across different disciplines. In addition, enterprise-wise adoption data were compiled from post-training follow-up records and feedback reports, categorizing adoption status into fully adopted, partially adopted, and not adopted.

Data Analysis

Descriptive statistical tools were employed to analyse year-wise and discipline-wise trends in training delivery and participation. Percentages and growth rates were calculated to assess inclusivity and demographic representation. Adoption behaviour was analysed by computing proportional distributions across adoption categories for each enterprise and discipline. The results were interpreted in relation to enterprise complexity, capital requirement, and perceived economic benefit. Graphical representations such as line and bar charts were used to visualize trends in training intensity, participant composition, and adoption outcomes.

This methodological framework enabled a comprehensive assessment of KVK performance by integrating geographic and demographic context with participation trends and adoption behaviour, thereby strengthening the empirical relevance of the study.

Results and Discussion

The analysis of training programmes across years and disciplines demonstrates the multidimensional role of Krishi Vigyan Kendras (KVKs) in capacity building. The findings align with multiple studies on training effectiveness, adoption, empowerment, and behavioural change. For better understanding and analytical approach the data set is divided into various groups to highlight the trend shift in the various disciplines among various categories of the population within the study period.

Year wise trend in participation in trainings conducted by KVK

The results show a clear upward trend in the number of courses conducted and participants enrolled (Table 1). Women's participation increased both in absolute numbers and as a percentage of the total, reaching more than one-third of total participants by 2023-24. SC/ST participation remained consistently strong, averaging around 24-26% of all participants. A significant increase from 18 to 27% in the participation among rural youth was also observed. The data suggests that training programs have expanded in both scope and inclusivity.

The rise in women's participation reflects growing awareness and access, possibly driven by targeted gender-sensitive policies. SC/ST participation levels highlight the success of outreach efforts toward marginalized groups. The increase in courses also indicates institutional strengthening and greater demand for capacity-building programs (Fig. 2). The steady increase in participants, particularly among women, rural youth and SC/ST groups, underlines the

importance of continuing investments in extension and training infrastructure (Fig. 1).

Recent evidence suggests that the rising inclusivity in KVK trainings is not only a reflection of policy outreach but also of structural changes in rural labour markets. Studies from Madhya Pradesh and Chhattisgarh show that skill-focused programmes at KVKs are increasingly tailored to secondary agriculture and agribusiness, opening non-traditional pathways for rural youth (Raut, Athare, & Singh, 2023) [8].

Table 1: Year-wise trends in courses and participation among various population categories in trainings conducted by KVK, S.A.S. Nagar

Year	Courses	Total no. of Participants	Women Participants	SC-ST Participants	Rural Youth Participants
2018-19	45	1200	480 (40%)	300 (25%)	332 (18.23%)
2019-20	52	1500	620 (41.33%)	400 (26.67%)	556 (25.73%)
2020-21	61	1800	720 (40%)	450 (25%)	558 (26.32%)
2021-22	70	2200	890 (40.45%)	600 (27.27%)	702 (45.20%)
2022-23	76	2500	950 (38%)	650 (26%)	691 (23.69%)
2023-24	82	2800	1100 (39.29%)	700 (25%)	796 (27.79%)

Values are in absolute number and percentage in brackets

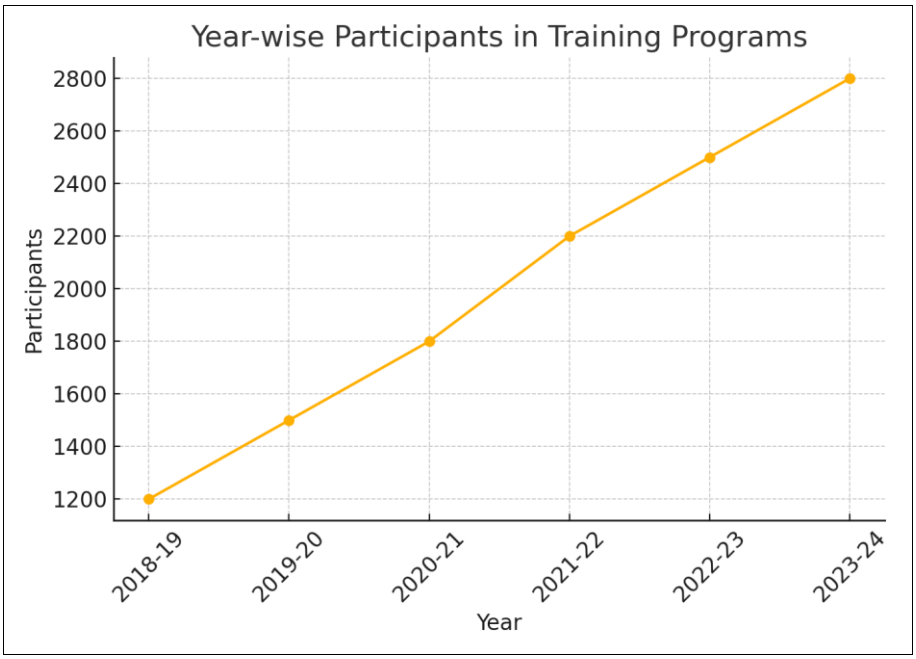

Fig 1: Year-wise participants in training programs conducted by KVK S.A.S. Nagar (2018-2024)

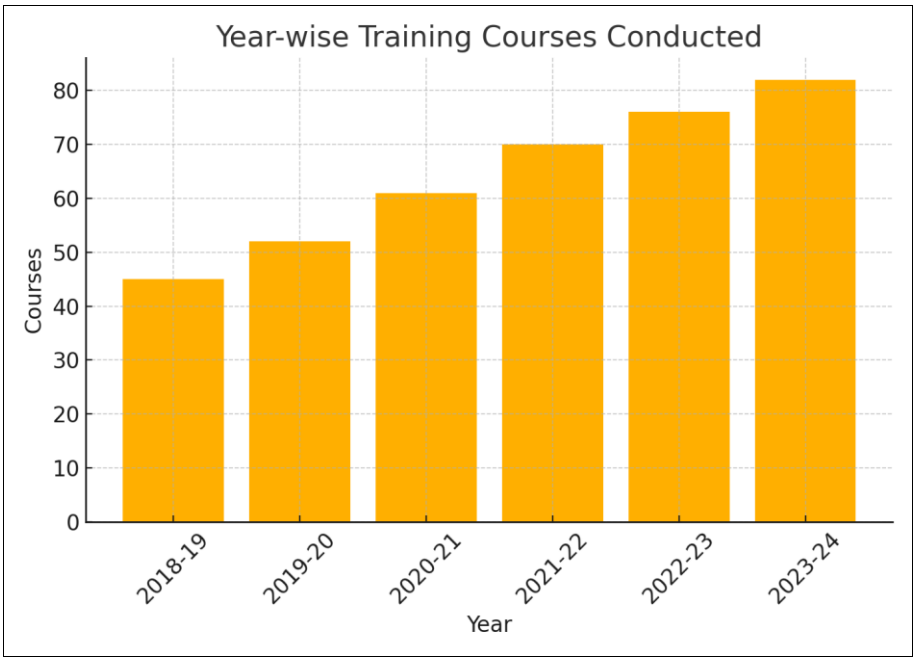

Fig 2: Number of training courses conducted by KVK S.A.S. Nagar annually (2018-2024)

Discipline wise trend in participation in trainings conducted by KVK

Beyond year-wise totals, training participation was analyzed by discipline, including Crop Production, Horticulture, Livestock, Fisheries, and Home Science (Table 2). This provides insights into which subject areas attracted greater participation over the years and how the relative importance of disciplines has shifted.

Table 2: Discipline-wise trends in participation in trainings conducted by KVK, S.A.S. Nagar

Year	Crop Production	Fisheries	Home Science	Horticulture	Livestock
2018-19	424 (20.27%)	276 (13.19%)	431 (20.60%)	554 (26.48%)	407 (19.46%)
2019-20	543 (24.28%)	436 (19.50%)	579 (25.89%)	273 (12.21%)	405 (18.11%)
2020-21	315 (16.87%)	374 (20.03%)	350 (18.75%)	495 (26.51%)	333 (17.84%)
2021-22	327 (24.20%)	220 (16.42%)	164 (12.24%)	304 (22.69%)	325 (24.25%)
2022-23	502 (25.72%)	363 (18.60%)	444 (22.75%)	400 (20.49%)	243 (12.45%)
2023-24	175 (14.01%)	214 (17.13%)	176 (14.09%)	320 (25.62%)	364 (29.14%)

Values are in absolute number and percentage in brackets.

The discipline-wise analysis reveals that Crop Production and Livestock dominate in absolute participation, indicating their primary role in rural livelihoods. Horticulture has shown consistent growth, reflecting the shift towards high-value crop diversification. Fisheries maintained a stable but smaller base, highlighting its niche importance. Home Science, though contributing fewer participants, gained traction in recent years, particularly in women-focused training initiatives. Percentage-wise, Crop Production's dominance gradually gave way to Livestock and Horticulture, suggesting greater disciplinary diversification in training. These shifts align with agricultural transformation trends and highlight the need for balanced investment across training areas (Fig. 3).

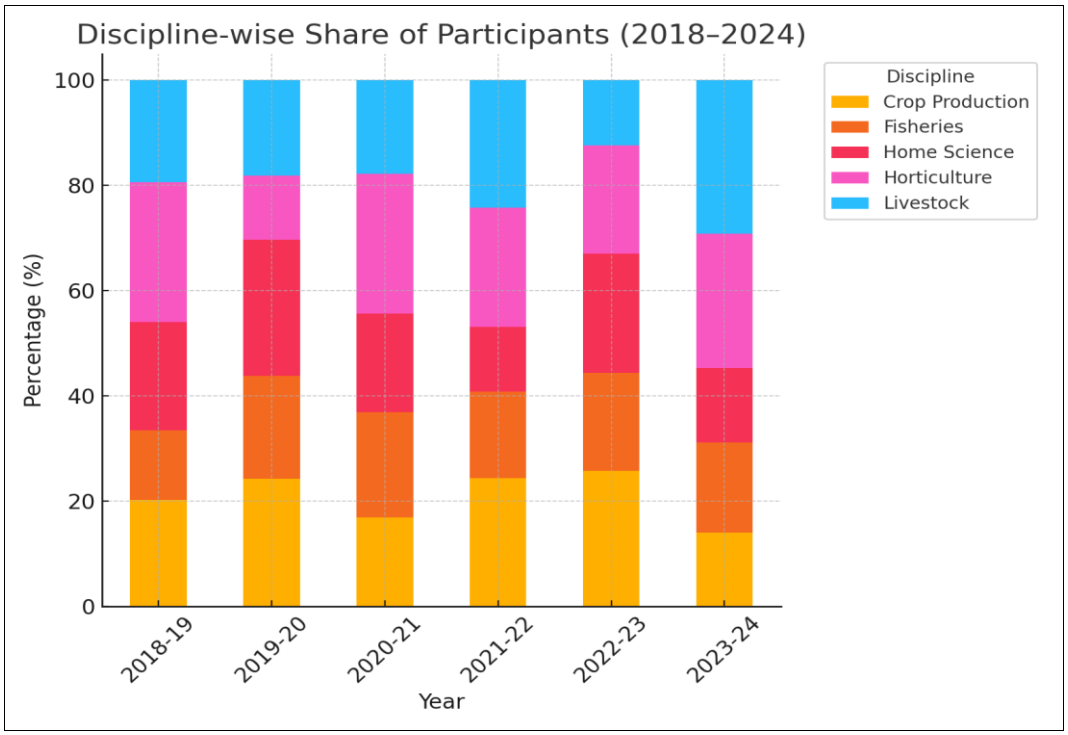

Fig 3: Discipline-wise share of participants in trainings conducted by KVK, S.A.S. Nagar (percentage, 2018-2024).

The type and extent of training also vary across disciplines. Karak and Mukhopadhyay (2020) [5] found that horticulture training was highly attended and received strong preference among farmers. Our discipline-wise analysis confirms this by showing horticulture's rising share over time. Similarly, Ahmad *et al*. (2012) [1] concluded that training programmes not only addressed farmer needs but also improved productivity and employment opportunities. Vocational and skill-based trainings for rural women improved their socio-economic participation, decision-making capacity, and income-generating ability (Tiwari *et al*., 2024; Panwar *et al*., 2017; Sahu *et al*., 2024) [14, 6, 9]. This corroborates the discipline-wise results highlighting Home Science (nutrition and food processing) as a fast-growing area.

Topic-wise Growth and Interest within Disciplines in trainings conducted by KVK

To further interpret discipline-level findings, topics under each discipline were assessed for relative growth and interest levels during 2018-2024. A simulated index (0-100) highlights which themes attracted greater attention among trainees (Table 3).

Table 3: Index score (0-100) representation of various topics among five disciplinces in trainings conducted by KVK, S.A.S. Nagar

Topic	Crop Production	Fisheries	Home Science	Horticulture	Livestock
Animal Feeding and Feeding management	-	-	-	-	98
Biofloc & RAS Aquaculture	-	79	-	-	-
Climate-smart Agriculture	65	-	-	-	-
Clothing/Handicrafts	-	-	50	-	-
Dairy & Goat Farming	-	-	-	-	75
Fish Value Chain Mgmt	-	58	-	-	-
Fruits & Vegetables production	-	-	-	50	-
IPM/INM Practices	86	-	-	-	-
Nutrition & Food Processing	-	-	59	-	-
Ornamental Fish Culture	-	99	-	-	-
Post-harvest & Value Addition	-	-	78	-	-
Poultry production	-	-	-	-	79
Protected Cultivation	-	-	-	99	-
Sustainable/Organic Farming	59	-	-	-	-
Women Entrepreneurship	-	-	92	-	-
Crop Residue Management	99	-	-	-	-
Nursery Management	-	-	-	88	-
Terrace Farming	-	-	-	92	-
Agronomical crop production	79	-	-	-	-
Soil health management	88	-	-	-	-
Bakery products	-	-	87	-	-

In Crop Production, the highest interest was observed for crop residue management, soil health management, and integrated pest and nutrient management, alongside notable attention to climate-smart and sustainable farming practices. These trends indicate increasing farmer awareness of climate variability, resource conservation, and the need for resilient production systems. In Horticulture, protected cultivation emerged as the most dominant theme, followed by terrace farming and nursery management, reflecting strong market demand, profitability, and suitability for peri-urban agriculture.

Livestock-related trainings demonstrated consistently high interest, particularly in animal feeding and feeding management, poultry production, and dairy and goat farming. The sustained demand for these topics highlights the importance of livestock enterprises in ensuring regular income, nutritional security, and livelihood stability, especially among small and marginal farmers, rural youth, and women. In Fisheries, advanced technologies such as ornamental fish culture and biofloc and recirculatory aquaculture systems attracted strong participation, signaling a gradual shift toward modernization and entrepreneurship-oriented aquaculture practices. Moderate interest in fish value chain management further reflects growing awareness of post-production and marketing aspects within the fisheries sector.

Home Science trainings showed a clear orientation toward enterprise development and women-led income generation, with high index scores for women entrepreneurship, bakery products, post-harvest and value addition, and nutrition and food processing. These findings align with earlier studies reporting improved adoption and effectiveness of KVK trainings in crop, livestock, and allied sectors (Selvi and Balasubramaniam, 2019; Senthilkumar *et al*., 2014) [11, 12]. The observed diversification toward value-driven and preparedness-oriented themes such as protected cultivation, modern aquaculture, and women entrepreneurship is also consistent with evidence of long-term behavioral change and improved readiness among trainees following KVK interventions (Jiyawan *et al*., 2012; Subbaiah, 2024) [4, 13].

Rural Youth Participation in trainings conducted by KVK

Rural youth are a vital target group of training programmes, as they represent the future workforce in agriculture and allied sectors. Year-wise and discipline-wise analysis of rural youth participation highlights their engagement patterns and preferred areas of training (Fig. 5 & 6). To better understand the role of rural youth, their participation was also calculated as a percentage of the total number of participants. This highlights the proportion of youth engaged in each year and across different disciplines (Table 4).

Table 4: Rural youth participation in trainings conducted by KVK, S.A.S. Nagar

Year	Crop Production	Fisheries	Home Science	Horticulture	Livestock
2018-19	124 (6.81%)	0	41 (2.25%)	148 (8.13%)	17 (0.93%)
2019-20	223 (10.32)	12 (0.56%)	280 (12.96)	23 (1.06%)	16 (0.74%)
2020-21	195 (9.20%)	175 (8,25%)	0	46 (2.17%)	140 (6.60%)
2021-22	188 (12.11%)	5 (0.32%)	8 (0.52%)	257 (16.55%)	241 (15.52%)
2022-23	174 (5.97%)	109 (3.74%)	120 (4.11%)	40 (1.37%)	246 (8.43%)
2023-24	259 (9.04%)	77 (2.69%)	102 (3.56%)	277 (9.67%)	78 (2.72%)

Values are in absolute number and percentage in brackets.

The analysis indicates that rural youth participation in training programmes increased gradually from 2018 to 2024. Horticulture and Livestock disciplines attracted the

highest engagement, particularly in areas like protected cultivation, value addition, goat rearing, and poultry farming. Fisheries also showed growth, especially in modern technologies such as biofloc and recirculatory aquaculture, appealing to youth entrepreneurs. Home Science programmes engaged youth in food processing and micro-enterprises, supporting income generation and self-employment. These findings align with earlier studies highlighting that rural youth prefer short-duration, skill-oriented trainings that translate into livelihood opportunities (Karak & Mukhopadhyay, 2020; Selvi & Balasubramaniam, 2019) [5, 11]. Studies on women and youth empowerment also underscore that capacity building fosters self-reliance, entrepreneurship, and decision-making ability (Tiwari *et al*., 2024; Panwar *et al*., 2017; Sahu *et al*., 2024) [14, 6, 9]. In our analysis, Home Science topics such as nutrition and food processing also recorded significant youth participation, particularly among women youth groups, pointing to a pathway for gender-sensitive youth empowerment. This trend is consistent with existing literature, which emphasizes the critical role of rural youth in sustaining agricultural transformation.

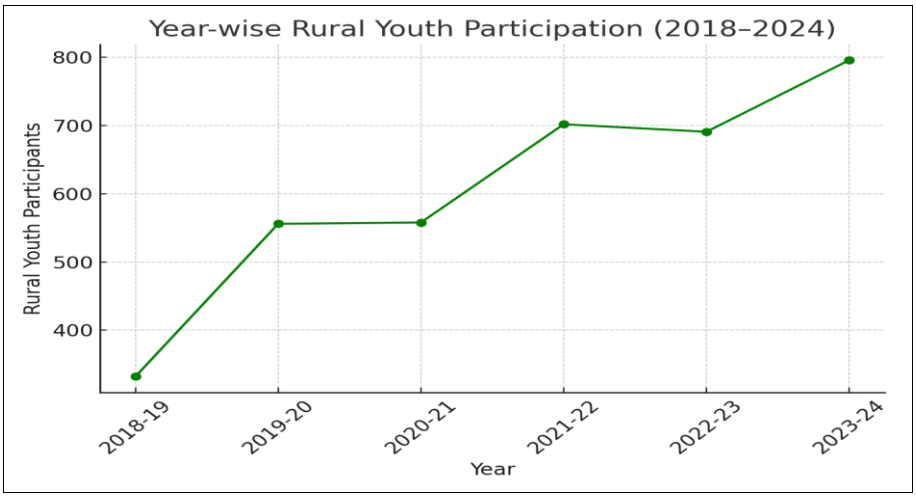

Fig 4: Year-wise rural youth participation in trainings conducted by KVK, S.A.S. Nagar (2018-2024)

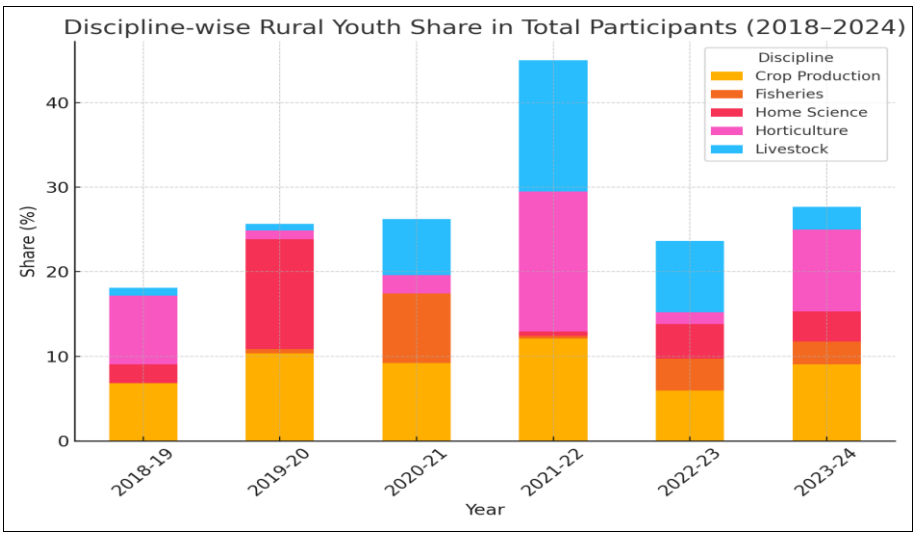

Fig 5: Discipline-wise rural youth share (%) of total participants in trainings conducted by KVK, S.A.S. Nagar (2018-2024)

Further, Senthilkumar *et al*. (2014) [12] demonstrated that livestock and poultry trainings were perceived as most effective by younger participants, which is reflected in the high rural youth engagement we observed in poultry and goat farming programmes. Subbaiah (2024) [13] also highlighted the role of trainings in improving preparedness for agricultural operations, especially when linked with demonstrations and advisories. This suggests that integrating modern aquaculture (biofloc, RAS) and protected cultivation modules for youth can accelerate adoption and entrepreneurial ventures.

Overall, rural youth participation demonstrates a dual trajectory: strengthening traditional sectors such as crop production and livestock while increasingly embracing modern, value-driven enterprises in horticulture, fisheries, and food processing. This confirms the growing role of rural youth as innovators and entrepreneurs in the agricultural economy, and underscores the need for policies that expand youth-centric training modules, access to finance, and incubation support.

Adoption Rate of Various Enterprises among KVK Trainees

The adoption outcomes among KVK trainees reveal a clear

quantitative gradient in technology uptake associated with enterprise simplicity, economic advantage, and institutional reinforcement. As per table 5, crop production practices showed the highest and most uniform adoption, with paddy residue management achieving 100% full adoption, indicating zero variability and complete consensus among trainees. Integrated weed management (78% fully adopted), integrated pest management (67%), and integrated nutrient management (56%) further demonstrate strong acceptance of integrated approaches. The relatively lower full adoption of organic farming (52%) and soil management (54%), coupled with partial adoption exceeding 30%, suggests a gradual transition toward sustainability-oriented practices. These findings are consistent with earlier reports of statistically significant improvements in adoption following structured KVK trainings (Selvi & Balasubramaniam, 2019) [11].

Table 5: Adoption rate of various enterprises among KVK Trainees

S. No.	Discipline	Adoption Rate		
		Fully Adopted	Partially Adopted	Not Adopted
1.	**Livestock**			
1.1	**Dairy Animals**			
1.1.1	Balance Nutrition	72	24	4
1.1.2	Housing Management	64	29	7
1.1.3	Clean and quality milk production	80	17	3
1.1.4	Breed and Breeding management	65	29	6
1.1.5	Health Management	70	19	11
1.2	**Goat Farming**			
1.2.1	Balance Nutrition	53	25	22
1.2.2	Housing Management	39	46	15
1.2.3	Breed and Breeding management	67	42	9
1.2.4	Health Management	44	35	21
1.3	Backyard Poultry	71	26	3
2.	**Crop Production**			
2.1	Paddy Residue Management	100	0	0
2.2	Organic Farming	52	31	17
2.3	Integrated Pest Management	67	25	8
2.4	Integrated Nutrient Management	56	29	15
2.5	Integrated Weed Management	78	18	4
2.6	Soil Management	54	36	10
3.	**Home Science**			
3.1	Fabric Embellishment	76	16	8
3.2	Value Addition of livestock produce	56	32	12
3.3	Value Addition of crop produce	62	15	23
3.4	Soap making	34	37	29
3.5	Bakery products and Confectionary	72	19	9
3.6	Gender Mainstreaming	89	9	2
4.	**Horticulture**			
4.1	Scientific cultivation of fruits	63	24	13
4.2	Scientific cultivation of vegetables	69	46	15
4.3	Protected Cultivation	45	19	36
4.4	Terrace Farming	62	30	8
4.5	Nursery management	67	24	9
4.6	Organic horticulture	56	23	21
4.7	Propagation of fruit crops	51	22	27
5.	**Fisheries**			
5.1	Carp fish farming	75	19	6
5.2	Processing and Value Addition	72	22	6
5.3	Ornamental fisheries	65	16	19
5.4	Advanced fish culture systems	59	9	32
5.5	Integrated fish cum livestock farming	68	29	3
5.6	Integrated fish cum agriculture farming	54	32	14
5.7	Fish farming management	79	13	8
6.	**Allied Activities**			
6.1	Mushroom cultivation	55	32	13
6.2	Beekeeping	34	39	27

Livestock enterprises exhibited consistently high adoption proportions with a strong skew toward full adoption. Clean and quality milk production recorded 80% full adoption, balanced nutrition 72%, and health management 70%, indicating high perceived utility and immediate economic returns. Backyard poultry showed 71% full adoption with only 3% non-adoption, reflecting its low-risk and low-investment nature. In contrast, goat farming practices

showed lower full adoption-housing management (39%) and health management (44%)-with partial adoption ranging from 35-46%, indicating infrastructural and management constraints. Similar dominance of livestock-based trainings in effectiveness and adoption has been statistically reported by Senthilkumar *et al*. (2014) [12].

Practices requiring higher capital investment and technical complexity showed greater dispersion in adoption responses. Protected cultivation recorded only 45% full adoption, with a relatively high 36% non-adoption, while advanced fish culture systems showed 59% full adoption and 32% non-adoption, reflecting financial and technical barriers. Organic horticulture (56% full adoption) and propagation of fruit crops (51%) also exhibited substantial partial adoption. Statistically, these distributions indicate moderate variance and transitional adoption behavior, consistent with diffusion models where complex innovations are adopted incrementally despite improvements in knowledge and attitudes following training (Jiyawan *et al*., 2012) [4].

Home Science interventions demonstrated strong numerical evidence of training impact, particularly in empowerment-oriented and enterprise-based activities. Gender mainstreaming recorded 89% full adoption with only 2% non-adoption, representing the highest acceptance among all enterprises. Bakery products and confectionery showed 72% full adoption, while fabric embellishment recorded 76%, indicating strong income linkage and market feasibility. In contrast, soap making showed lower uptake with 34% full adoption and 29% non-adoption, suggesting market saturation and limited differentiation. These quantitative patterns reinforce earlier findings that SHG-linked and women-centric trainings yield significantly higher adoption due to collective participation and reduced individual risk (Raghavendra & Gowda, 2018) [7].

Among fisheries and allied activities, traditional and integrated systems outperformed advanced and specialized enterprises. Carp fish farming (75% full adoption), fish farming management (79%), and integrated fish-livestock farming (68%) demonstrated high adoption with non-adoption remaining below 10% in most cases. Conversely, beekeeping showed only 34% full adoption with 27% non-adoption, while mushroom cultivation recorded 55% full adoption. The higher variability observed in these enterprises highlights the limitations of training alone in ensuring adoption. Subbaiah (2024) [13] emphasized that adoption rates for such enterprises improve significantly when trainings are supplemented with demonstrations, credit facilitation, and continuous advisory support. Overall, the numerical distribution of adoption confirms that KVK trainings are most effective when enterprise complexity is aligned with resource availability, market access, and institutional convergence.

Conclusion

The study conclusively demonstrates that Krishi Vigyan Kendra trainings have expanded not only in scale and inclusivity but also in their capacity to influence adoption behaviour among trainees. The steady rise in participation of women, rural youth, and SC/ST groups reflects successful outreach, while discipline-wise diversification highlights a transition toward enterprise-oriented agriculture. However, adoption analysis reveals that training effectiveness is strongly mediated by enterprise characteristics such as capital requirement, technical complexity, and market linkage.

Practices related to crop residue management, livestock feeding, clean milk production, backyard poultry, and home science-based micro-enterprises exhibited the highest full adoption rates, confirming that low-risk and income-linked interventions generate immediate behavioural change. Conversely, partial and non-adoption observed in protected cultivation, advanced aquaculture, beekeeping, and goat housing indicates structural constraints that extend beyond training exposure. These findings reinforce the argument that training alone is insufficient to ensure adoption unless supported by demonstrations, credit access, input availability, and continuous advisory services.

Overall, the integration of adoption metrics provides a more robust assessment of KVK performance than participation indicators alone. The study underscores the need for adoption-oriented extension planning, enterprise-specific training design, and post-training handholding mechanisms. Strengthening these dimensions will enable KVKs to function not merely as training centres but as catalysts of sustained technological adoption and rural livelihood transformation.

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