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Evolving Extension Priorities in a Temperate Horticulture System: Four-Year Trend Analysis of Krishi Vigyan Kendra Programmes

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Abstract

The main finding of this study is a clear shift in extension priorities, moving from general awareness programs to more structured, skill-based training that meets changing climate needs. Understanding how these priorities change is important for better planning and policy decisions. While Krishi Vigyan Kendras (KVKs) regularly record extension activities, their data is rarely analyzed for deeper insights. This study looked at four years (2021–2024) of extension program data from ICAR-KVK Baramulla to track changes in priorities. We collected and analyzed secondary data on the number, type, and participation in extension programs using descriptive trend analysis. The results show a steady move from general awareness programs to more structured training, with a greater focus on skill-building and climate-responsive activities. These findings show that regular institutional data can reveal important changes in extension priorities and help with adaptive planning.

***Key words*:** Extension trends, Temporal analysis, Krishi Vigyan Kendra, Extension priorities, Horticulture systems

Horticulture constitutes the backbone of the agrarian economy of the Kashmir Valley, with temperate fruit crops such as apple, pear, cherry, walnut, and almond contributing significantly to farm income, employment generation, and export earnings. Among the districts of North Kashmir, Baramulla occupies a prominent position owing to its extensive area under temperate horticultural crops, diverse altitudinal gradients, and high dependence of rural livelihoods on orchard-based farming systems. However, horticulture in the region is undergoing rapid transformation due to changing climatic patterns, recurrent biotic stresses, declining soil health, labour scarcity, and increasing market and quality standards [1].

These emerging challenges necessitate a dynamic and responsive agricultural extension system capable of addressing location-specific constraints while facilitating the adoption of improved, climate-resilient, and market-oriented horticultural practices. In this context, Krishi Vigyan Kendras (KVKs), functioning under the aegis of the Indian Council of Agricultural Research (ICAR), play a pivotal role in technology assessment, refinement, and dissemination at the grassroots level. The KVK in Baramulla has been instrumental in promoting scientific orchard management through on-farm trials (OFTs), frontline demonstrations (FLDs), skill-oriented trainings, and advisory services tailored to the temperate horticulture of the Kashmir Valley [2].

Over the past decade, extension priorities in temperate horticulture have progressively shifted from conventional yield enhancement approaches towards integrated and sustainable production systems. Greater emphasis has been placed on climate-resilient technologies, high-density plantations, integrated nutrient and pest management, protected cultivation of vegetables, post-harvest handling, value addition, and market linkage. These shifts are particularly relevant for Baramulla district, where fluctuating weather conditions, emerging pest-disease complexes, and increasing input costs pose serious challenges to orchard productivity and profitability [3].

Despite the critical role of KVKs in steering horticultural development, systematic analyses capturing temporal changes in extension programming at the district level remain limited, especially in the temperate context of the Kashmir Valley. A trend-based evaluation of KVK activities can provide meaningful insights into how extension systems have adapted to farmers' evolving needs, policy interventions, and technological advancements. Such evidence is essential for refining future extension strategies and ensuring optimal utilization of institutional resources [4].

Agricultural extension systems operate in dynamic socio-economic and environmental contexts, requiring continuous adaptation of priorities and strategies [5-6]. These contexts necessitate an investigation into how temporal analysis of extension activities offers valuable insights into institutional responses to emerging challenges, policy directions, and farmer needs over time [7]. Therefore, understanding these dynamics is crucial for informing the development of extension strategies that are both responsive and proactive. Krishi Vigyan Kendras (KVKs) in India implement a wide range of extension programmes, including training, awareness programmes, lectures, and exposure visits [8]. While annual reporting primarily focuses on activity counts, the critical analysis of changing extension focusses over time using institutional data

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has been largely overlooked [9-10]. Therefore, this study aims to fill this gap by analyzing how these programmes have evolved in a temperate horticulture context.

In temperate horticulture regions such as Jammu and Kashmir, extension priorities are influenced by factors such as climate variability, pest pressures, orchard intensification, and post-pandemic recovery of farm systems [11-12]. Understanding how extension programming has evolved in response to these factors can inform future planning and policy decisions. Therefore, the present study aims to identify and analyze temporal shifts in extension priorities of ICAR–KVK Baramulla over four years (2021–2024), to examine the evolving extension priorities in a temperate horticulture system. By analyzing the nature, thematic orientation, and distribution of KVK interventions over time, the study aims to assess the responsiveness and effectiveness of extension efforts in addressing region-specific horticultural challenges.

MATERIALS AND METHODS

The present study was conducted using secondary data obtained from ICAR–Krishi Vigyan Kendra (KVK), Baramulla, located in the temperate horticulture zone of Jammu and Kashmir, a region predominantly characterized by apple-based farming systems and the dominance of small and marginal horticultural holdings [13]. Programme-wise and year-wise data covering a four-year period from 2021 to 2024 were compiled from the Annual Performance Appraisal Reports (APARs) of the horticulture section and verified with official extension records maintained at the KVK, prepared in conformity with ICAR operational and reporting guidelines [14-15]. For analytical purposes, all extension interventions were systematically classified into four major categories, namely training programmes, awareness programmes, lectures/talks, and exposure visits, to ensure uniformity and comparability across years. The frequency of programmes and the corresponding number of participants under each category were extracted and organized year-wise. Descriptive statistical tools, including totals, percentages, and trend comparisons, were employed to analyze temporal changes and identify shifts in extension priorities and outreach emphasis over the study period. The analytical framework followed established methodologies for extension system assessment and trend analysis as suggested by Birner *et al.* [16], Singh and Meena [17].

RESULTS AND DISCUSSION

Year-wise distribution of extension programme types

The composition of extension activities of the Horticulture section changed noticeably over the four years (Table 1). The relative share of structured training programmes increased, while awareness-oriented programmes showed a gradual decline in proportional terms. The year-wise distribution of different types of extension programmes conducted during the period from 2021 to 2024 is presented in (Table 1). The data reveal a consistent increase in the total number of extension programmes over the years, rising from 138 programmes in 2021 to 156 programmes in 2024. This gradual increase indicates an expansion and strengthening of extension efforts aimed at improving knowledge dissemination, skill development, and technology transfer among stakeholders.

Among the different extension programme types, trainings emerged as the most dominant activity throughout the study period. The number of training programmes increased steadily from 60 in 2021 to 90 in 2024, accounting for a substantial proportion of the total extension activities each year. The marked rise in trainings reflects a growing emphasis on capacity building, hands-on learning, and skill-oriented interventions, which are essential for enhancing farmers' competence and encouraging adoption of improved agricultural practices [18-19].

In contrast, awareness programmes showed a declining trend, decreasing from 42 in 2021 to 32 in 2024. Awareness programmes are primarily aimed at sensitizing beneficiaries to new technologies, schemes, and innovations. The observed reduction may suggest that foundational awareness had already been created in earlier years, leading to a strategic shift toward more intensive and application-oriented extension methods such as trainings and exposure visits [20-21].

A similar decreasing pattern was observed in lectures and talks, which declined from 30 programmes in 2021 to 22 programmes in 2024. This reduction indicates a gradual move away from conventional, lecture-based extension approaches toward participatory and experiential learning methods. The declining reliance on lectures suggests an evolving extension strategy that prioritizes interactive engagement and practical exposure over one-way information dissemination [22].

Conversely, exposure visits recorded a steady increase, doubling from 6 in 2021 to 12 in 2024. Although the absolute number of exposure visits was comparatively lower than other programme types, the increasing trend highlights the growing recognition of experiential learning and farmer-to-farmer interaction as effective tools for technology transfer. Exposure visits enable participants to observe successful practices under real field conditions, thereby enhancing confidence and adoption potential [23].

Overall, the results indicate not only a quantitative increase in extension activities but also a qualitative shift in extension approaches over the years. The transition from awareness creation and lectures toward trainings and exposure visits reflects a more demand-driven, participatory, and impact-oriented extension system. Such a shift is likely to improve the effectiveness of extension programmes by strengthening practical skills, facilitating experiential learning, and promoting sustainable adoption of agricultural innovations.

Table 1 Year-wise distribution of extension programme types

Year	Trainings	Awareness programmes	Lectures / talks	Exposure visits	Total
2021	60	42	30	6	138
2022	70	40	28	8	146
2023	81	35	25	10	151
2024	90	32	22	12	156

Temporal trend in farmer participation

Farmer participation increased across all extension activities, with a sharper rise observed in structured training programmes compared to awareness programmes (Table 2). The year-wise participation of farmers in different extension programmes conducted during the period from 2021 to 2024 is presented in (Table 2). The data reveal a consistent increase in overall farmer participation across the years, indicating an expanding outreach and improved engagement of beneficiaries in extension activities. Total farmer participation increased

from 4,600 in 2021 to 5,880 in 2024, reflecting a steady strengthening of extension–farmer linkage over the study period [24].

Participation in training programmes recorded the highest numbers in all four years and showed a pronounced increasing trend. The number of farmers attending trainings increased from 2,150 in 2021 to 3,740 in 2024, accounting for the major share of total participation. This substantial rise underscores the growing preference of farmers for skill-based, practical, and problem-oriented learning platforms. The increasing attendance in trainings suggests that such programmes effectively address farmers' needs by providing hands-on exposure to improved technologies and management practices [25-26].

In contrast, farmer participation in awareness programmes exhibited a gradual decline over the years, decreasing from 1,400 in 2021 to 1,180 in 2024. Awareness programmes primarily focus on information dissemination and sensitization; therefore, the declining participation may indicate that basic awareness regarding key technologies and schemes had already been achieved among the target groups. Consequently, farmers appear to be shifting toward programmes that offer deeper technical insights and practical utility [27]. A similar downward trend was observed in participation in lectures and talks, which declined from 900 participants in 2021 to 720 in 2024. This reduction reflects diminishing farmer interest in conventional lecture-based extension approaches, which are largely one-way and less interactive. The trend indicates a preference for participatory learning environments that facilitate dialogue, demonstration, and experiential learning rather than passive information reception [28].

On the other hand, participation in exposure visits increased steadily from 150 in 2021 to 240 in 2024. Although exposure visits involved comparatively fewer participants, the consistent increase highlights the growing recognition of experiential learning and peer learning as effective extension tools. Exposure visits allow farmers to observe successful innovations under real farm conditions, thereby enhancing confidence and motivation for adoption [29].

Overall, the results demonstrate not only an increase in farmer participation but also a shift in farmers' engagement patterns with different extension approaches. The increasing participation in trainings and exposure visits, coupled with declining attendance in awareness programmes and lectures, reflects a transition toward more interactive, experiential, and need-based extension interventions. Such a trend is indicative of a maturing extension system that prioritizes impact, skill development, and technology adoption over mere information dissemination [30].

Table 2 Year-wise farmer participation in extension programmes

Year	Trainings	Awareness	Lectures	Exposure visits	Total
2021	2,150	1,400	900	150	4,600
2022	2,620	1,320	840	180	4,960
2023	3,180	1,260	780	210	5,430
2024	3,740	1,180	720	240	5,880

Shift from awareness-centric to training-centric extension

The proportion of total participation accounted for by structured trainings increased from 46.7 per cent in 2021 to 63.6 per cent in 2024, indicating a shift towards more intensive capacity-building approaches. The relative share of different extension activities in total farmer participation during the period from 2021 to 2024 is presented in (Table 3). The data indicate marked changes in the composition of extension participation over the years, reflecting evolving preferences of farmers and a strategic reorientation of extension approaches [31].

Training programmes consistently accounted for the highest share of total participation and exhibited a pronounced increasing trend over the study period. The proportion of farmers participating in trainings increased from 46.7 per cent in 2021 to 63.6 per cent in 2024. This substantial rise underscores the growing importance of skill-oriented, hands-on, and problem-solving extension interventions. The increasing dominance of trainings suggests that farmers increasingly value programmes that provide practical knowledge and directly contribute to improved farm decision-making and productivity [32].

In contrast, the share of awareness programmes declined steadily, decreasing from 30.4 per cent in 2021 to 20.1 per cent in 2024. Awareness programmes are primarily designed to introduce and sensitize farmers to new technologies and schemes. The declining share indicates that baseline awareness may have already been established among a large section of the farming community, thereby reducing the relative demand for such programmes in favour of more intensive capacity-building activities.

A similar downward trend was observed in the share of lectures and talks, which declined from 19.6 per cent in 2021 to 12.2 per cent in 2024. This reduction reflects diminishing reliance on conventional, lecture-based extension methods, which often involve one-way communication. The trend highlights a shift toward participatory and experiential learning approaches that encourage interaction, discussion, and field-level application [33].

Conversely, the share of exposure visits, although comparatively small, showed a gradual increase from 3.3 per cent in the year 2021 to 4.1 per cent in the year 2024. The increasing proportion of participation in exposure visits underscores the growing recognition of experiential learning and peer-to-peer knowledge exchange. Exposure visits enable farmers to observe successful innovations in real-world conditions, thereby enhancing confidence and facilitating technology adoption [34].

Table 3 Share of extension activities in total participation (%)

Year	Trainings	Awareness	Lectures	Exposure visits
2021	46.7	30.4	19.6	3.3
2022	52.8	26.6	16.9	3.6
2023	58.5	23.2	14.4	3.9
2024	63.6	20.1	12.2	4.1

Overall, the results demonstrate a clear qualitative transformation in extension participation patterns, with a strong shift toward trainings and experiential learning methods and a corresponding decline in awareness programmes and lectures. This changing distribution reflects a more demand-driven, participatory, and impact-oriented extension system, aligned with contemporary extension paradigms that emphasize capacity building, experiential learning, and sustainable adoption of agricultural innovations [35].

The results indicate a clear temporal shift in extension priorities from awareness-oriented interventions towards structured and intensive training programmes. This transition reflects increasing institutional emphasis on skill development and problem-specific capacity building, consistent with contemporary extension reform narratives [36-37].

The gradual increase in exposure visits, though limited in number, suggests growing recognition of experiential learning approaches within KVK programming [38-39]. Declining proportional emphasis on lectures and awareness programmes does not indicate reduced importance but rather strategic rebalancing of extension methods [40].

Such temporal evolution aligns with climate-responsive and innovation-system-based extension frameworks advocated at national and international levels [41].

Policy implications

The observed temporal shifts in the composition of extension activities and farmer participation patterns underscore the need for institutionalizing annual trend analysis within the monitoring and evaluation frameworks of Krishi Vigyan Kendras (KVKs) to enable evidence-based planning and timely course correction. Extension planning should remain flexible and adaptive, allowing programmes to respond effectively to emerging challenges such as climate variability, market uncertainties, and evolving farmer demands. The increasing preference for skill-oriented and experiential learning approaches highlights the need for greater integration of exposure visits and intensive training programmes within routine extension planning to enhance practical learning and technology adoption. Moreover, temporal indicators such as changes in participation patterns, proportional shifts among extension methods, and longitudinal engagement trends should complement conventional activity counts in assessing extension performance, as they provide deeper insights into programme relevance, effectiveness, and impact. Incorporating such dynamic evaluation metrics will strengthen strategic decision-making and improve the responsiveness and accountability of extension systems, in line with national extension guidelines and policy recommendations [14], [17].

CONCLUSION

The present study clearly demonstrates a progressive transformation in the nature, scale, and orientation of extension activities implemented by the Horticulture section during the period from 2021 to 2024. The steady increase in the total number of extension programmes and overall farmer participation reflects an expansion of extension outreach and a strengthening of institutional engagement with farming communities. More importantly, the findings reveal a pronounced qualitative shift in extension strategies, moving away from predominantly awareness-oriented and lecture-based approaches toward more structured, skill-intensive, and experiential learning interventions. Training programmes emerged as the central pillar of extension delivery, both in terms of frequency and farmer participation, indicating a growing demand for practical, problem-solving, and application-oriented knowledge among farmers. The declining relative share of awareness programmes and lectures suggests that baseline awareness has largely been achieved, allowing extension systems to reorient their focus toward deeper capacity building and technology adoption. At the same time, the gradual increase in exposure visits highlights the rising recognition of experiential and peer-learning approaches as effective mechanisms for reinforcing learning and promoting confidence in innovation adoption. Overall, the temporal trends observed across programme composition, participation levels, and proportional shares point to a maturing, demand-driven, and impact-oriented extension system. This evolution is well aligned with contemporary extension paradigms that emphasize participatory learning, innovation systems thinking, and climate-resilient agricultural development. Sustaining this momentum will require continued emphasis on training quality, expansion of experiential learning opportunities, and strategic balancing of extension methods to ensure inclusiveness, relevance, and long-term sustainability of extension outcomes. The study demonstrates that extension priorities at ICAR–KVK Baramulla evolved significantly over the four years, with increasing emphasis on structured training and experiential learning. Temporal analysis of routine institutional data provides a valuable yet underutilized tool for adaptive extension planning.

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