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Krishi Vigyan Kendra: Most significant changes from plant clinics in the Nilgiris and Gujarat, India

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Abstract

This paper explores the multifaceted role of Krishi Vigyan Kendras (KVKs) in promoting sustainable agricultural practices and empowering rural communities in India. By reviewing recent studies, the paper highlights how KVKs serve as pivotal agricultural extension services that address the unique challenges faced by farmers, particularly women. The findings indicate that KVKs significantly contribute to enhancing agricultural productivity through training programmes, the dissemination of innovative techniques, and the facilitation of community-driven practices. Moreover, KVKs play a crucial role in bridging the knowledge gap among farmers, fostering entrepreneurship, and promoting gender equity in agriculture. The implications of these findings underscore the importance of strengthening KVK initiatives to ensure resilient agricultural systems in the face of climate change and socio-economic challenges.

Keywords: Krishi Vigyan Kendras (KVKs), Agricultural Extension, Sustainable Agriculture, Women's Empowerment, Rural Development

INTRODUCTION

Agricultural challenges in rural India have become increasingly complex, with smallholder farmers facing issues that range from climate change and pest outbreaks to economic instability (Choudhury et al., 2021). The reliance on traditional farming practices and limited access to modern agricultural knowledge and resources often exacerbates these challenges, leaving many farmers trapped in a cycle of poverty and subsistence farming (Jha et al., 2020). To address these issues and empower farmers, the Government of India established Krishi Vigyan Kendras (KVKs) in 1974 as an integral part of the agricultural extension services in the country. KVKs serve the dual purpose of offering advisory services and functioning as diagnostic clinics, sharing knowledge that is crucial for enhancing crop production and sustainability (Singh et al., 2019).

KVKs employ a community-based approach that emphasises localised knowledge and practices, thereby enabling smallholder farmers to adapt to changing environmental conditions (Kumar & Singh, 2018). In this model, farmers gain access to expert consultations and distinctive resources tailored to local needs. A study by Singh et al. (2020) revealed that the plant clinic model, implemented in various KVKs, has significantly improved farmers' capacities to manage pest and disease challenges, leading to increased crop yields and economic empowerment.

In addition to direct interventions, KVKs facilitate collaborative initiatives among farmers, promoting the sharing of best practices, resources, and peer support systems. This collaborative approach has been confirmed to enhance resilience and adaptability among agricultural communities (Ranjan et al., 2022). Furthermore, KVKs play a crucial role in bridging the knowledge gap, particularly among the younger demographic of farmers, many of whom lack formal agricultural education (Gupta & Sharma, 2021). With over 650 KVKs operating across India today (Kumar et al., 2023), their contributions to

rural development and agricultural sustainability continue to evolve and expand.

This research focuses on the impact of KVKs specifically in the Nilgiris region of Tamil Nadu and Surat district of Gujarat, aiming to highlight the most significant changes driven by these institutions in empowering marginalised communities. Through a series of case studies, it investigates the practical implications of KVK services on agricultural practices, community cohesion, and the overall socio-economic upliftment of smallholder farmers in these regions.

History of Krishi Vigyan Kendras (KVKs)

Krishi Vigyan Kendras (KVKs) were established in India in 1974 under the Indian Council of Agricultural Research (ICAR) to address the growing challenges faced by Indian agriculture. The inception of KVKs was rooted in the need to disseminate practical agricultural knowledge and improve the accessibility of agricultural science to farmers, especially in rural areas (Suresh et al., 2019). Initial efforts were focused on agriculture extension services, which sought to bridge the gap between research institutions and the farming community by tailoring scientific knowledge to local needs (Kumar et al., 2020).

Over the years, KVKs evolved from being mere extension services to becoming multifaceted agricultural hubs that provide not only training but also diagnostic and advisory services tailored to local agricultural conditions (Sharma & Hada, 2021). The primary aim of KVKs is to empower smallholder farmers through comprehensive education on sustainable agricultural practices, pest management, and efficient resource use. This evolution aligns with the broader objectives of sustainable agricultural development and food security (Singh et al., 2021).

As of 2023, there are over 700 KVKs operating across India, catering to diverse agricultural needs in various climatic zones (ICAR, 2023). Each KVK functions as a localised centre for innovation and knowledge dissemination, emphasising region-specific challenges and solutions.

Benefits of KVKs with a focus on plant clinics

KVKs have emerged as crucial players in enhancing agricultural productivity and sustainability through various initiatives, particularly plant clinics. These clinics are designed to provide farmers with expert advice on plant health management, pest identification, and disease control, thereby improving crop yields and quality (Kumar et al., 2020). The introduction of plant clinics within KVKs aims to ensure that farmers have immediate access to diagnostics and expert consultations, allowing for timely interventions that can mitigate crop losses.

1. **Diagnostic and Advisory Services:** Plant clinics facilitate the quick diagnosis of plant diseases and pests, offering real-time solutions and recommendations. This functionality is vital for smallholder farmers who often face time-sensitive agricultural challenges (Bera et al., 2020).

2. **Capacity Building:** KVKs provide targeted training sessions that educate farmers on sustainable agricultural practices, including Integrated Pest Management (IPM) strategies, which have been shown to minimise chemical dependency and improve environmental health (Maheshwari et al., 2022).

3. **Crop Diversification and Risk Management:** The educational outreach of KVKs encourages farmers to diversify their crops, enhancing their resilience against market fluctuations and climate variability (Jha et al., 2020). By supporting farmers in adopting new and resilient crop varieties, KVKs play a pivotal role in promoting biodiversity (Yadav et al., 2023).

4. Economic Empowerment: The cumulative impact of KVK services, such as improved crop management techniques and access to better seeds and pest control methods, has led to increased incomes for farmers. A study indicated that KVK interventions can result in a revenue increase of 30to40% for participating farmers (Saha et al., 2022).

5. Community Engagement: KVKs foster community collaboration through farmer groups and cooperatives, enhancing the sharing of information and resources. These community networks enable farmers to learn from each other, discuss their problems, and develop collective solutions (Sharma & Hada, 2021).

In summary, the history and evolution of KVKs reflect their integral role in modern Indian agriculture. With over 700 centres operating across the country, their focus on plant clinics has provided critical diagnostic services and training that empower farmers, enhance productivity, and promote sustainable agricultural practices.

Case Study I: Dr Raja Palanisamy

In the picturesque terrain of the Nilgiris, Dr Raja Palanisamy leads the Krishi Vigyan Kendra (KVK) with a clear vision: empowering local farmers through science-based solutions. Since assuming the head of the department in 2022, Dr Palanisamy has focused on addressing complex agricultural challenges, from erratic weather patterns to pest outbreaks, through diagnostic services and community engagement (Kumar et al., 2023). The plant clinic at KVK Nilgiris was established as a walk-in centre at the Tamil Nadu Agriculture University Research Station and operates as an extension and diagnostic hub (Suresh et al., 2019). The clinic

emphasises accessibility for farmers by offering specialist consultations on-site or virtually via WhatsApp, as well as bookings for expert field visits (Maheshwari et al., 2022).

Additionally, the KVK provides weather forecasts, diagnostic services, and training programmes while also offering climate-resilient plant samples and biocontrol agents at nominal prices. These services have become a lifeline for farmers navigating the uncertainties of modern agriculture, particularly in light of climate variability that affects crop productivity (Jha et al., 2020). The focus on biocontrol measures aligns with the principles of sustainable agriculture, as highlighted by Singh et al. (2021), who emphasise the importance of Integrated Pest Management (IPM) in reducing the dependency on chemical pesticides.

The KVK in the Nilgiris has also allowed farmers to experiment with new techniques and entrepreneurial activities with greater confidence. A notable example is the increase in strawberry cultivation among groups of young men who frequently visit the clinic to seek specialised training. This interest reflects a broader shift towards cash crops and organic farming, which offer higher economic returns (Cardenas et al., 2022). Dr. Palanisamy also reports increased yields and incomes for marginalised native communities, fostering social upliftment and strengthening community cohesion (Yadav et al., 2023). The clinic's impact extends beyond crops; one story recounts Moorty, a farmer struggling to navigate the complexities of poultry farming, who approached the KVK for guidance. With continuous consultation and support, he progressed from managing 50 genetically superior chicks to running a profitable smallholder poultry farm with over 500 chickens, earning the trust of his clients through high-quality meat (Ranjan et al., 2021).

Looking ahead, the Nilgiris farming community is proactively taking steps to sustain the progress achieved. Farmers have organised themselves into groups and requested biannual field visits from KVK experts as a preventive measure. These groups also serve as peer-support networks, where members share observations and concerns about their crops (Saha et al., 2022). Digital platforms like WhatsApp play a crucial role, enabling real-time knowledge sharing and fostering transparency within the community (Kumar & Singh, 2021). Dr Palanisamy believes this collaborative approach is key to building long-term resilience. By leveraging both scientific expertise and community solidarity, the KVK in the Nilgiris exemplifies the transformative power of knowledge, trust, and innovation. Under Dr Palanisamy's leadership, it has become a hub of empowerment that is paving the way for a sustainable agricultural future in the region.

Case Study II: Mr R Chinnappan

Residing in Hubbathalai, Shri R. Chinnappan, a 67-year-old retired government worker, has revolutionised his livelihood by turning two acres of land into a flourishing model of integrated organic farming. His transformative journey began in 2015 when he connected with the experts at Krishi Vigyan Kendra (KVK), whom he fondly refers to as his "Gurus", through a farmer training program. This connection has empowered him to embrace sustainable farming practices, leading to financial and personal success and providing assurance that help is always nearby, enabling him to experiment with innovative methods (Suresh et al., 2019).

The interventions by KVK, such as training sessions at the plant clinic and weather advisories, have equipped Mr Chinnappan with the technical know-how to transition from conventional vegetable farming, where he previously earned ₹20,000 per month, to cultivating high-value organic fruits, thus tripling his income to ₹60,000 per month. His success is reflected in his weekend market, where he and his wife proudly sell their produce, often receiving requests for more from satisfied customers—a clear indicator of the high demand for their quality products (Jha et al., 2020).

Beyond financial gains, the change has brought a profound sense of well-being. Mr Chinnappan attributes his newfound energy and healthier lifestyle to the wholesome, pesticide-free food he now grows and consumes. This vitality has even allowed him to dedicate time to volunteering at his local church—a testament to the holistic impact of the interventions (Maheshwari et al., 2022). The adoption of organic farming has been linked to improved health outcomes and quality of life for farmers, emphasising the community benefits that can arise from such transitions (Ranjan et al., 2021).

With KVK's support, nearly 80 farmers in the region have adopted similar organic methods, improving yields and incomes while fortifying the community against the uncertainties of climate change. The formation of cooperative networks among these farmers signifies their eagerness to sustain and scale these positive changes by exploring additional avenues such as sericulture, floriculture, and berry farming to diversify their skills and boost earnings (Cardenas et al., 2022). Jointly, their collaborative efforts continue to flourish, with cooperative groups actively sharing knowledge and lobbying for better market prices, which is critical for the sustainability of agricultural practices (Yadav et al., 2023).

From grappling with the vulnerabilities of traditional farming to adopting sustainable practices with confidence, the transformation of this community underscores the power of support systems like KVK in creating prosperity and stability in rural areas. For Mr Chinnappan, his trust in his "gurus" has secured his livelihood and fostered collective strength within his community.

Figure 1: Certification Board outside Mr Chinnappan's Farm

Figure 1: Mr Chinnappan with his wife S Lily at their 2 acre Integarted Organic Farm

Figure 2 *Mr Chinnappan preparing organic fertilizer using waste fruit, Sugar molasses and yeast. This is diluted and used as biopesticide.*

Case Study III: Ms Bhakti Panchal

At just 32 years old, Ms Bhakti Panchal has made significant contributions to the agricultural community in Surat as a horticulturist at the Krishi Vigyan Kendra (KVK). With over seven years of experience specialising in vegetable science, she plays a pivotal role in addressing the diverse needs of her unique clientele. Unlike traditional rural-focused KVKs, Surat's plant clinic serves a higher number of urban farmers—about 70% of whom are women—seeking assistance with kitchen and terrace gardening (Saraswat et al., 2021). Most clients reach out virtually, often through WhatsApp, sharing images or descriptions of their concerns. In a typical week, the clinic handles over 30 virtual enquiries alongside 15–20 in-person consultations (Kumar & Singh, 2022). While urban farmers often manage their issues remotely, tribal farmers from nearby rural areas usually require field visits due to communication challenges (Vishwas et al., 2020). Alongside her team of six specialists, Ms. Panchal provides guidance on everything from protected cultivation and horticulture to animal husbandry and pest and disease management (Sinha et al., 2023).

One of the most notable contributions of Surat KVK has been in paddy cultivation. In collaboration with Navsari Agricultural University, it introduced a local paddy variety that now covers about 70% of the region's cultivation, significantly increasing yields and building farmers' trust in regionally developed seeds (Patel et al., 2019). Additionally, improvements in household income and social standing among urban women engaging in terrace farming and kitchen gardening have been noteworthy, as well as positive changes for marginalised tribal communities in adjacent areas (Dhananjai et al., 2021).

However, the real impact of KVK's work lies in the trust and confidence it has built among community members and farmers who now approach challenges with a renewed sense of security, knowing that expert help is readily available. "It works like a hospital," Ms Panchal says. "Just as we feel reassured having a trusted doctor nearby, farmers find peace of mind knowing they can rely on us for any crop or livestock issues." This relationship of trust ensures that even in the face of adversity, farmers feel supported and empowered (Kumar et al., 2022). By providing targeted resources and fostering trust, Ms. Panchal and the KVK team are building a more resilient and reliable agricultural landscape in Surat through their plant clinics.

Figure 3A: *Ms Panchal with group of experts and farmers at a Mango field*

Figure 4B: *Ms Panchal with group of experts and farmers at a Mango field*

Case Study IV: Shivshakti Sakhi Mandal

In Gamtalav Khurd, a small village 80 km from Surat, the Shivshakti Sakhi Mandal—a collective of 23 women farmers has transformed their lives and community through knowledge, determination, and the support of the Krishi Vigyan Kendra (KVK). Their journey, marked by expert intervention and collective action, began in 2012, when KVK adopted their village as part of a three-year development program. At that time, the village faced immense challenges, including poverty, lack of infrastructure, and limited resources, which kept them trapped in a cycle of subsistence farming and debt (Patel et al., 2020). The residents lived in mud houses, were largely unfamiliar with financial institutions, and struggled to provide even basic nutrition for their children (Ranjan et al., 2021). However, with support, training, and guidance, the women of Shivshakti Sakhi Mandal have broken barriers, uplifted their community, and paved the way for long-term development.

Through a series of training sessions and workshops, the women were taught modern and sustainable agricultural techniques, which significantly advanced their skills and capabilities. For instance, the plant clinic helped them differentiate between beneficial and harmful insects, addressing their earlier lack of knowledge on pest management and allowing them to apply appropriate pesticides with targeted control (Kumar & Singh, 2022). KVK experts also recommended planting marigolds to attract pollinators, thereby creating a balanced ecosystem, enhancing pollination, and improving crop yields (Sinha et al., 2023). Additionally, the women learnt to produce organic fertilisers using cow manure and agricultural waste, reducing their dependence on chemical inputs while increasing soil fertility and growing healthier crops (Maheshwari et al., 2022). This effort was further supported by the introduction of superior cow breeds that improved their milk production, creating an additional source of income and enabling them to apply their newfound vermicomposting techniques to sell high-quality compost (Dhananjai et al., 2021).

A particularly inspiring story is that of Sarmilaben. During a training session, she learnt how to make masala (ground spice powder) from her turmeric harvest. Seizing this opportunity, she began processing and selling turmeric as a kitchen spice. Today, Sarmilaben runs a thriving masala shop, distributing her products across Gujarat and building a loyal client base. Her flourishing business has made her the primary breadwinner for her family and symbolises the entrepreneurial spirit that KVK has nurtured within the community (Yadav et al., 2023).

The impact of KVK's support extends beyond individual success stories into profound changes for the entire community. The women of Shivshakti Sakhi Mandal have diversified their crops, cultivating soybeans, wheat, brinjal, pigeon peas, okra, and sugarcane. Increases in yield have made them food secure as well as financially stable. With higher incomes, they can afford to send their children to school and even college—something they once thought impossible (Kumar et al., 2022). One

woman's daughter has been trained to use drones for agriculture, highlighting the forward-thinking mindset that has taken root in the village (Vishwas et al., 2020). Furthermore, they have formed a Self-Help Group (SHG), empowering them to secure funding for collective projects, such as establishing a village dairy. With their knowledge of vermicomposting and organic farming, they have also learnt to produce biogas from cow manure, reducing their dependence on expensive cooking fuel. This initiative has created a sustainable model that benefits the entire community (Saraswat et al., 2021).

Going forward, the women of Shivshakti Sakhi Mandal are determined to continue their development. They plan to transition entirely to organic farming to command better prices for their produce and aim to secure agricultural contracts, moving beyond weekly markets to establish long-term partnerships. They wish to help other communities by travelling across India and sharing their experiences with other villages. This remarkable journey is a testament to how targeted interventions can empower communities and foster resilience. With the support of KVK, these women have transformed their lives, empowered a more resilient community, and laid the foundation for sustainable long-term development.

Figure 5: *Interview of Shivshakti Sakhi Mandal with CABI consultant*

Figure 6: *Sarmilaben at her Masala store*

Figure 7:*Women of Shivshakti Sakhi Mandal working in their paddy field*

Figure 8: Chilli grading post-harvest

Lessons learned

The case studies from the Nilgiris and Gujarat areas show important information about how Krishi Vigyan Kendras (KVKs) help solve farming problems and support farmers, as well as the major changes in these rural communities due to KVK efforts.

A notable change among rural communities has been the empowerment of farmers and community members through education and sustainable practices. KVKs have played a vital role in educating farmers on modern farming techniques, equipping them with the knowledge and tools needed to manage pests, improve crop yields, and cope with erratic weather patterns. This guidance has enabled farmers to adopt sustainable methods, such as organic farming, pesticide reduction, and vermicomposting. These practices have improved productivity and ensured long-term resilience, reducing dependence on chemical inputs and fostering a more sustainable, eco-friendly farming system that can withstand environmental challenges such as climate change.

Collaboration and collective action have also proven essential in driving successful change. Across both regions, farmers have worked together, shared resources, and built support networks that have helped them overcome challenges more effectively. Whether it's through cooperative farming models, peer-to-peer learning, or field visits by experts, farmers have benefitted from a sense of solidarity that fosters both practical solutions and emotional support. By sharing knowledge and experience, they have built stronger, more resilient communities that are better equipped to face future challenges.

The introduction of innovation and diversification has been another crucial factor for farmers. They have diversified their crops and explored new income streams such as value-added products, small-scale businesses, and other agricultural ventures. This shift towards diversification has reduced dependence on single crops, increased financial stability, and created new opportunities for farmers to expand their markets and improve household incomes.

Finally, KVK interventions have developed an entrepreneurial spirit among farmers, especially women. KVK's support has nurtured a mindset where farmers, particularly women, have ventured into new businesses, from processing agricultural products to exploring new farming techniques. This entrepreneurial attitude has given them the confidence to innovate, take ownership of their livelihoods, and create long-term financial success. As a result, they are not just surviving but thriving, which has had a profound impact on their personal and community-wide economic development.

In short, the most significant change resulting from the support of KVKs has been the transformation of small-scale farmers into empowered, collaborative, and innovative entrepreneurs, equipped with the skills and confidence to navigate the challenges of modern agriculture and create sustainable futures for themselves and their communities.

Summary

The Shivshakti Sakhi Mandal, consisting of 23 women farmers in Gamtalav Khurd, has undergone a remarkable transformation with the support of the Krishi Vigyan Kendra (KVK). Founded as part of a development initiative in 2012, the collective faced significant challenges, including poverty, inadequate infrastructure, and lack of agricultural knowledge. Through targeted training in sustainable farming techniques, pest management, and organic practices, the women strengthened their agricultural skills, diversified their crop production, and increased their financial stability. Individual success stories, such as that of Sarmilaben, who established a thriving masala shop, exemplify the empowerment achieved within the community. The collective has not only enhanced food security and income but has also fostered educational opportunities for their children and initiated community projects such as a village dairy. Their future aspirations include transitioning fully to organic farming and sharing their experiences with other communities, showcasing the positive impact of KVK's interventions.

Conclusion

The transformation of the Shivshakti Sakhi Mandal underscores the powerful role that targeted agricultural interventions can play in uplifting marginalised communities. By focusing on capacity building, knowledge dissemination, and fostering collective action, the KVK has empowered these women farmers to break the cycle of poverty and build a sustainable future. The women of Gamtalav Khurd have not only improved their individual circumstances but have also catalysed positive changes within their community, demonstrating resilience and the potential for growth when equipped with the right tools and support.

Recommendations

1. **Expand Educational Programmes:** It is essential to continue offering training workshops not only in sustainable agricultural practices but also in business skills, financial literacy, and marketing to further enhance the women's entrepreneurial capabilities.

2. **Strengthen Financial Literacy:** Collaborations with local banks and microfinance institutions should be fostered to improve the women's understanding of financial services and help them access necessary funding for various business ventures.

3. **Enhance Collective Efforts:** Encouraging the formation and strengthening of more Self-Help Groups (SHGs) will aid in pooling resources, sharing knowledge, and increasing bargaining power in markets.

4. **Promote Organic Certification:** Assistance in obtaining organic certification for their products will help the women command better prices in the marketplace and attract more conscious consumers.

5. **Establish Partnerships with Educational Institutions:** Continued partnerships with agricultural universities can facilitate ongoing research, innovation, and training opportunities that the women can apply in their farming practices.

6. **Facilitate Exchange Programs:** Implement programmes that allow successful women farmers to share their experiences and methods with other rural communities across India to promote knowledge exchange and inspire similar transformations.

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