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Role of Subject Matter Specialists in Krishi Vigyan Kendras: Bridging Agricultural Research, Technology and Farmers

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Indian agriculture is rapidly changing due to climate variability, emerging pests and diseases, declining natural resources, changing market demands and the need for higher farm profitability. In this changing scenario, Krishi Vigyan Kendras (KVKs) play an important role in connecting agricultural research institutions with farmers. At the heart of this system are Subject Matter Specialists (SMSs), who provide scientific and technical support in specific disciplines such as Agronomy, Horticulture, Plant Protection, Soil Science, Agricultural Engineering, Animal Science, Fisheries and Home Science. SMSs translate scientific knowledge into practical, locally suitable solutions and help farmers adopt improved technologies. Their activities include on-farm testing, frontline demonstrations, farmer training, field diagnosis, advisories, technology dissemination and feedback to researchers. With the growing importance of climate-resilient agriculture, natural farming, digital agriculture, mechanization, value addition and entrepreneurship, the responsibilities of SMSs are expanding. This article highlights the important role of SMSs in KVKs and their contribution to increasing agricultural productivity, profitability, sustainability and farmers' capacity to make informed decisions.

Keywords: Krishi Vigyan Kendra, Subject Matter Specialist, Agricultural Extension, Technology Transfer, Farmer Training, On-Farm Testing, Frontline Demonstration, Climate-Smart Agriculture

Introduction

Agriculture is not simply about producing crops; it is a complex system involving soil, water, climate, technology, markets, livestock, machinery and human resources. Farmers need timely and reliable scientific information to make appropriate decisions. However, agricultural technologies developed in research laboratories cannot automatically become successful at the farm level. They need to be tested under local conditions, demonstrated to farmers and adapted according to farmers' needs. This is where Krishi Vigyan Kendras (KVKs) have a crucial role. KVKs are district-level frontline extension institutions under the Indian Council of Agricultural Research (ICAR) system. Their mandate is technology assessment and demonstration for application and capacity development. ICAR currently reports a network of 731 KVKs, functioning as important knowledge and resource centres for agriculture and allied sectors. Within KVKs, Subject Matter Specialists (SMSs) are the technical backbone. An SMS combines subject expertise with field-level extension work. Rather than simply transferring information from scientists to farmers, an SMS acts as a bridge between research and real farming situations.

Who is a Subject Matter Specialist?

A Subject Matter Specialist is a technical expert working in a particular agricultural discipline. Depending on the mandate and staffing of a KVK, specialists may work in areas such as Agronomy, Horticulture, Soil Science, Plant Protection, Agricultural Engineering,

Animal Science, Fisheries, Home Science and other allied disciplines. The SMS is expected to understand both scientific principles and farmers' practical problems. A recommendation that works well in a research station may not always produce the same result in a farmer's field because of differences in soil, rainfall, irrigation, farm size, labour availability, machinery, input costs and market conditions. Therefore, the SMS evaluates technologies under local conditions and helps farmers select suitable practices.

SMS as a Bridge between Research and Farmers

The most important contribution of an SMS is connecting three groups:
Research institution → KVK → Farmer
Researchers develop new technologies, varieties, production practices and management techniques. The SMS helps assess their suitability under local agro-climatic conditions and communicates the results to farmers in simple and practical language. At the same time, farmers provide valuable feedback about problems encountered in the field. The SMS documents these problems and communicates them to research institutions. Thus, the process becomes a two-way flow of knowledge rather than a one-way transfer of technology. ICAR identifies technology assessment, demonstrations and capacity development as the core functions of KVKs.

Major Roles of SMS in KVKs

1. Identification of Farmers' Problems

The first step in effective extension is understanding the actual problem. SMSs regularly visit villages and interact with farmers to identify problems related to crop production, soil fertility, pests, diseases, water management, machinery, livestock and post-harvest activities. For example, farmers may report declining crop yields, increasing pest incidence or high cultivation costs. The SMS investigates the problem and suggests scientifically appropriate solutions.

2. On-Farm Testing

Technologies cannot be recommended universally without considering local conditions. SMSs participate in On-Farm Trials (OFTs) to assess the suitability of technologies under farmers' field conditions. These trials help determine whether a variety, fertilizer management practice, pest-control method, irrigation technique or farm machinery is appropriate for a particular location. ICAR reports that KVKs conduct large-scale technology assessment through trials at farmers' fields to identify location-specific technological options.

3. Frontline Demonstrations

Seeing is often more convincing than simply hearing about a technology. SMSs organize Frontline Demonstrations (FLDs) to show the performance of improved technologies directly in farmers' fields. For example, an improved variety can be compared with the farmer's existing variety. Similarly, demonstrations may be conducted on integrated pest management, improved nutrient management, water-saving practices, farm machinery or climate-resilient technologies. Such demonstrations help farmers understand the practical benefits, costs and limitations of new technologies.

4. Training and Capacity Building

Training is one of the most visible activities of KVKs. SMSs organize training programmes for farmers, farm women, rural youth and extension personnel.
Training may cover:

- Improved crop production
- Soil and water management
- Horticulture
- Plant protection
- Farm mechanization
- Dairy and livestock management
- Post-harvest management
- Food processing and value addition

- Entrepreneurship
- Natural and climate-resilient farming
- Digital agriculture

The objective is not only to provide information but also to develop practical skills.

5. Farm Advisory Services

Farmers frequently require immediate advice regarding pest attacks, diseases, nutrient deficiencies, weather-related risks and crop management. SMSs provide diagnostic and advisory services through field visits, telephone, WhatsApp, digital platforms, farmer meetings and other ICT tools. ICAR reports that KVKs are increasingly functioning as knowledge and advisory centres and are using digital mechanisms such as the Kisan Sarathi platform for farmer advisories. Indian Council of Agricultural Research

6. Promotion of Climate-Resilient Agriculture

Climate change is creating new challenges through irregular rainfall, heat stress, droughts, floods and changing pest and disease patterns. SMSs have an important role in promoting climate-resilient technologies such as drought-tolerant varieties, water-saving techniques, crop diversification, integrated farming systems, soil-health management and contingency planning. KVKs are also involved in programmes related to climate-resilient agriculture and natural resource management. Indian Council of Agricultural Research

7. Promotion of Farm Mechanization

Agricultural Engineering SMSs can help farmers select appropriate machinery and equipment according to farm size, crop type, soil conditions and economic capacity. Demonstrations of seeders, planters, harvesters, precision equipment, irrigation systems and residue-management machinery can reduce labour requirements and production costs.

8. Women and Rural Youth Empowerment

SMSs also contribute to improving rural livelihoods beyond conventional crop production. Training in food processing, mushroom cultivation, beekeeping, nursery production, dairy, poultry, value addition and small-scale enterprises can create additional sources of income. Such activities are particularly important for women and rural youth, helping agriculture become an enterprise rather than merely a traditional occupation.

9. Feedback to Agricultural Researchers

The SMS is also the voice of farmers within the research-extension system. Information collected from farmers can help researchers identify gaps in existing technologies and develop improved solutions. This feedback mechanism makes agricultural research more responsive to actual field requirements.





10. Promoting Digital and Modern Agriculture

The role of SMSs is now expanding beyond traditional extension. Modern SMSs increasingly need knowledge of mobile applications, remote sensing, drones, precision farming, digital advisory services, weather information and data-based decision-making. Recent ICAR initiatives also emphasize strengthening the professional competencies of KVK personnel in response to emerging challenges, including climate-related risks.

The Changing Role of SMS

The traditional role of an SMS was mainly to provide technical recommendations. Today, the role is much broader. An SMS is increasingly becoming a scientist, trainer, communicator, problem solver, technology evaluator, facilitator and innovation promoter. Farmers are also becoming more informed and connected through smartphones and social media. Therefore, SMSs must communicate scientific information in simple, credible and farmer-friendly ways. The future SMS will need to combine scientific expertise + communication skills + digital knowledge + field experience + entrepreneurship orientation.

Conclusion

Subject Matter Specialists are among the most important links in the agricultural extension system. They convert scientific knowledge into practical field solutions and bring farmers' experiences and problems back to researchers. Through on-farm testing, frontline demonstrations, training, advisory services and technology dissemination, SMSs help farmers adopt appropriate technologies. As Indian agriculture faces climate change, resource constraints, labour shortages and changing market requirements, the importance of KVKs and their SMSs will continue to increase. Strengthening the technical knowledge, digital skills, field exposure and professional capacity of SMSs can make KVKs even more effective in achieving productive, profitable, resilient and sustainable agriculture.

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