CHAPTER
8

# THE ROLE OF FARMER FIELD SCHOOLS (FFS) IN PROMOTING CLIMATE-SMART AGRICULTURE

**R. Priyanka**
*School of Agriculture and Animal Sciences*
*The Gandhigram Rural Institute – Deemed to be University, Dindigul, Tamil Nadu*
*Email – priyankarajashekaran@gmail.com*

*DOI: https://doi.org/10.34293/blp.9789395659581.ch008*

**Abstract**
*Climate change poses significant challenges to global agricultural systems, particularly in developing countries where farming is highly climate-sensitive and forms the backbone of rural livelihoods. Climate-Smart Agriculture (CSA) has emerged as a strategic approach to enhance productivity, strengthen resilience, and reduce greenhouse gas emissions. In this context, Farmer Field Schools (FFS) serve as an effective participatory extension model that empowers farmers through experiential, field-based learning. This chapter examines the role of FFS in promoting CSA by enhancing farmers' ecological knowledge, adaptive capacity, and decision-making skills. It highlights how FFS facilitates the adoption of climate-resilient practices such as drought-tolerant varieties, water-efficient irrigation, integrated farming systems, agroforestry, and sustainable soil management. The chapter also discusses the contribution of FFS to climate mitigation, community awareness, gender inclusion, and institutional linkages. While acknowledging challenges such as high implementation costs and the need for skilled facilitators, the study emphasizes the potential of integrating digital tools and strengthening research–extension–farmer partnerships. Overall, FFS emerges as a transformative platform for building climate-resilient agricultural systems and fostering sustainable rural development.*
***Keywords:*** *Farmer Field Schools (FFS), Climate-Smart Agriculture (CSA), Sustainable Agriculture*

## Introduction

Climate change has emerged as one of the most critical challenges facing global agricultural systems in the 21st century. Agriculture is highly sensitive to climatic variations, and even small changes in temperature, rainfall patterns, or the frequency of extreme weather events can significantly affect crop yields, livestock health, soil fertility and overall farm productivity. In developing countries—where agriculture forms the backbone of the rural economy—the impacts of climate change are even more pronounced. Against this backdrop, the need for climate-smart solutions has become increasingly urgent.

Farmer Field Schools (FFS) have emerged as an influential extension approach promoting climate resilience, sustainable farming, and community awareness. Originating from the need to strengthen farmers' decision-making skills, the FFS model provides a

participatory learning environment in which farmers learn, experiment and adopt improved agricultural practices.

This chapter explores the diverse roles of FFS in advancing climate-smart agriculture (CSA) and enhancing public awareness, presenting a comprehensive understanding suitable for academic, training and policy contexts.

## Understanding Farmer Field Schools (FFS)

### Concept and History of FFS

A Farmer Field School (FFS) is a season-long, field-based training programme organized around the major stages of crop or livestock production. Each activity corresponds to a specific phase of plant or animal growth, helping farmers understand development patterns and associated management practices. Although FFS models differ across regions and institutions, they all emphasize participatory, experiential, and discovery-based learning, where farmers learn by observing, experimenting, and making decisions in the field (FAO 2018; SUSTAINET 2010; FAO 2005).

### Origin and Evolution of FFS

FFS began in Asia in the late 1980s, introduced by the Food and Agriculture Organization (FAO) to address the growing problem of pesticide overuse in rice ecosystems. Its initial goal was to equip farmers with the skills to:

- Evaluate field conditions independently
- Make informed decisions on crop management
- Reduce dependence on chemical pesticides

Over time, the FFS approach expanded beyond its original focus on Integrated Pest Management (IPM). Today, FFS programs cover a wide range of themes including:

- Sustainable agriculture practices
- Soil and water conservation
- Climate-smart agriculture and climate adaptation
- Biodiversity and natural resource management
- Community strengthening and rural empowerment

FFS sessions typically consist of 8–9 meetings where facilitators and farmers discuss their observations, conduct experiments and exchange experiences, integrating local knowledge with scientific insights. This makes FFS a strong platform for knowledge co-creation, particularly relevant for climate-smart agriculture.

### Principles of FFS

The effectiveness of FFS depends significantly on the training and skills of facilitators. Traditional extension workers are often trained in technology dissemination rather than adult education, participatory learning or facilitation. FFS therefore requires facilitators to adopt new approaches that encourage discovery-based and experiential learning.

Key principles of FFS include:

- Learning through hands-on experimentation

- Empowerment through collective decision-making
- A curriculum guided by farmers' needs and priorities
- Regular, structured meetings throughout a production cycle
- Emphasis on skill and competency development rather than technology adoption alone
- Facilitation that fosters critical thinking rather than top-down instruction
- Integration of local knowledge with scientific ecological principles

These principles make FFS an ideal platform for introducing and scaling climate-smart agricultural practices.

**Structure and Operation of FFS**

Typical FFS operations include:

- Weekly field-based sessions throughout the cropping season
- Small groups of 20–30 farmers
- Hands-on activities such as agro-ecosystem analysis (AESA), field trials and demonstrations
- A trained facilitator who supports discussion, experimentation and decision-making

Farmers observe crop growth stages, environmental interactions and management outcomes, comparing traditional practices with improved climate-smart alternatives.

**Climate-Smart Agriculture: A Framework for Resilient Farming**

Climate-smart agriculture (CSA) aims to transform agricultural systems to support food security under changing climatic conditions. CSA is built on three interconnected pillars:

- Sustainable increase in agricultural productivity
- Building resilience and adaptive capacity to climate change
- Reducing greenhouse gas emissions where possible

The FFS model aligns well with these pillars because of its participatory, ecological and knowledge-intensive approach.

**Role of FFS in Promoting Climate-Smart Agriculture**

**Enhancing Farmers' Knowledge and Skills**

FFS enhances farmers' understanding of ecological processes such as soil health, water cycles, pest dynamics and biodiversity, all of which are essential for climate-smart decision-making. Through structured field observations and group discussions, farmers learn to:

- Identify climate-induced changes in crop growth or pest incidence
- Interpret weather advisories and forecasts
- Adjust planting and harvesting schedules
- Select climate-resilient crop varieties

The experiential nature of FFS strengthens farmers' confidence to experiment, innovate and make informed decisions.

**Promotion of Climate-Resilient Agricultural Practices**

FFS exposes farmers to a wide range of climate-smart technologies and practices, including:

- Drought-tolerant and short-duration crop varieties
- Water-efficient irrigation systems such as drip and micro-sprinklers
- Soil moisture conservation using mulches, green manures and cover crops
- Integrated Farming Systems (IFS) that diversify production and reduce climate risks

Through group experiments, farmers test, compare and evaluate practices, which improves adoption rates and local adaptation.

**Building Adaptive Capacity**

Climate adaptation involves modifying agricultural practices to minimize risks and maintain productivity under variable climatic conditions. FFS enhances adaptive capacity by helping farmers:

- Understand seasonal climate trends
- Use agro-advisory services and ICT-based weather tools
- Modify crop calendars based on rainfall variability
- Adopt intercropping and mixed cropping systems
- Improve livestock housing, nutrition and shade management under heat stress

Collective learning enhances preparedness and encourages timely responses to climate risks.

**Supporting Climate Change Mitigation Efforts**

Mitigation efforts in FFS aim to reduce the carbon footprint of farms. Key practices include:

- Organic farming, composting and vermicomposting
- Efficient fertilizer management to reduce nitrous oxide emissions
- Agroforestry and tree-based systems for carbon sequestration
- Reduced tillage and improved residue management
- Improved manure handling and biogas systems to minimize methane emissions

By reducing chemical dependency and enhancing ecosystem services, FFS contributes to climate mitigation goals

**FFS as a Platform for Community-Based Climate Awareness**

**Strengthening Public Awareness on Climate Change**

FFS discussions incorporate climate-related themes such as:

- Causes and impacts of climate change
- Trends in extreme weather events
- Soil degradation, water scarcity and declining biodiversity
- Sustainable natural resource management

This helps strengthen community awareness and encourages climate-resilient living.

**Farmer-to-Farmer Extension and Community Outreach**

FFS graduates often emerge as community resource persons or farmer-trainers. They:

- Share knowledge with neighbors
- Conduct field days, demonstrations and exposure visits
- Promote climate-smart practices in local meetings and farmer groups

Such peer learning strengthens the multiplier effect beyond the original FFS participants.

**Gender and Youth Inclusion in Climate Awareness**

FFS provides space for meaningful participation of women and rural youth. Their involvement improves:

- Household-level decision-making on climate adaptation
- Community-level resilience building
- Awareness of nutrition, health and sustainable resource use

Greater inclusion ensures equitable and sustainable climate action.

**FFS and Strengthening Institutional Linkages for Climate Action**

**Linkages with Research Institutions and KVKs**

FFS acts as a bridge between farmers and scientific institutions such as research centers and Krishi Vigyan Kendras (KVKs). It facilitates access to:

- Latest scientific findings
- Improved seeds and technologies
- Weather advisories and early warning systems
- Government schemes promoting climate resilience

**Collaboration with Government Programs**

Government initiatives such as the National Mission for Sustainable Agriculture (NMSA) rely heavily on community-based extension. FFS strengthens these programs by serving as platforms for field testing, demonstration and farmer-level adaptation of climate-smart interventions.

**Partnerships with NGOs and International Agencies**

Many NGOs have incorporated FFS into climate adaptation projects. International agencies such as FAO, UNDP and IFAD also support FFS-based programs to enhance community resilience, promote sustainable land use and build adaptive capacity.

**Case Examples from India and Other Countries**

**India**

FFS initiatives in states like Andhra Pradesh, Tamil Nadu and Odisha have supported farmers in adopting drought-resilient crop varieties, improving water management and reducing pesticide dependency through ecological farming.

**Africa**

In Kenya and Tanzania, FFS programs have promoted agroforestry, conservation agriculture and rainwater harvesting, significantly improving resilience among smallholder farmers.

**Southeast Asia**

Across countries such as the Philippines, Thailand and Indonesia, FFS has played a vital role in ecological rice farming, risk reduction and farmer empowerment.

**Limitations and Challenges of FFS in Climate-Smart Agriculture**

Although Farmer Field Schools (FFS) have proven highly effective in building farmer capacity, several limitations continue to affect their implementation and long-term impact in Climate-Smart Agriculture (CSA):

**1. High Cost per Participant**

FFS requires resources for facilitators, training materials, demonstration plots, field equipment, and season-long activities. This makes the cost of training each participant relatively high compared to other extension approaches.

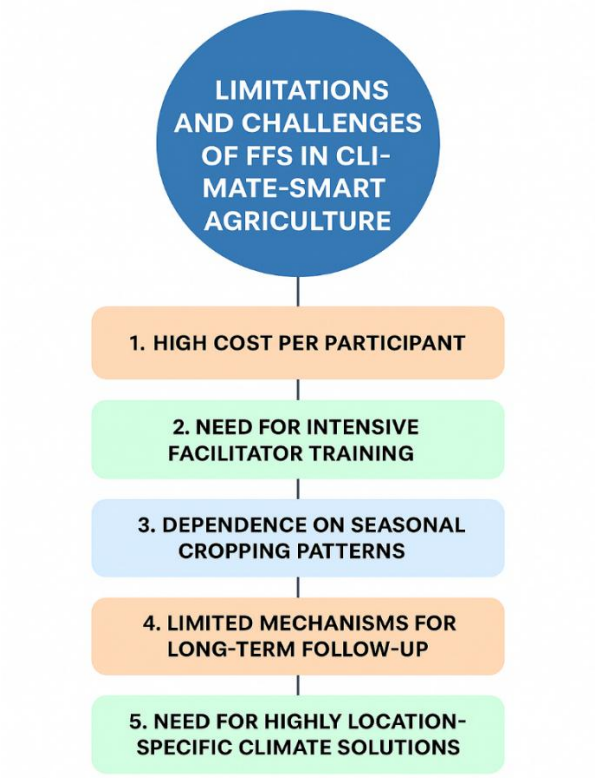


**Figure 8.1. Limitations and Challenges of FFS in Climate-Smart Agriculture**

**2. Need for Intensive Facilitator Training**

Effective FFS delivery relies heavily on skilled facilitators who can guide participatory learning, conduct field experiments, and support decision-making. Training such facilitators demands significant time, continuous capacity building, and investment.

**3. Dependence on Seasonal Cropping Patterns**

Since FFS follows the natural growth cycle of crops or livestock, its schedule is fully dependent on seasonal conditions. Droughts, floods, or delayed monsoons can disrupt the training process and reduce learning opportunities.

**4. Limited Mechanisms for Long-Term Follow-Up**

After graduation, farmers may not receive sustained technical support. Without structured follow-up, adoption of Climate-Smart practices may decline over time, and documentation of impacts becomes difficult.

**5. Need for Highly Location-Specific Climate Solutions**

Climate impacts and CSA practices vary widely across regions. FFS must be adapted to specific agro-ecological zones, which requires localized research, customized training modules, and continuous updates—adding complexity to scaling efforts.

**Future Directions for Strengthening FFS in Climate Action**

Future improvements may include:

- Integration of digital tools for weather forecasts, market prices and advisory services
- Mobile and app-based FFS learning modules
- Stronger research–extension–farmer linkages
- Community-based climate action planning through FFS groups
- Expansion of climate-smart modules in livestock, fisheries and agroforestry

A successful FFS requires:

- Well-trained facilitators
- Clear definition and demonstration of CSA practices
- Motivated and organized farmer groups
- Institutional support from government and NGOs
- Appropriate technology availability
- Strong monitoring, evaluation and logistical support

**Core Components of a Successful FFS**

**Participants**

Small and medium farmers motivated to learn CSA practices form the core of an FFS group. Women and youth participation is especially encouraged due to their key roles in household- and community-level resilience.

**Facilitators**

Facilitators guide learning, encourage critical thinking and help adapt CSA practices to local contexts. They require specialized training in participatory methods and climate-smart agriculture.

**Researchers and Technical Experts**

They provide technical backstopping, scientific recommendations and adaptation advice.

**Field as a Classroom**

The field serves as a learning laboratory where farmers conduct experiments, compare practices and observe ecological processes firsthand.

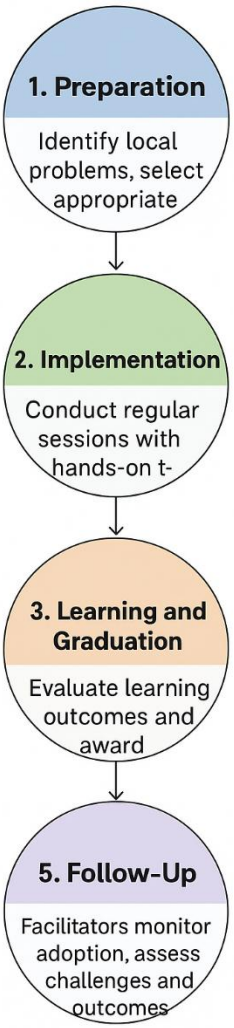


**Figure 8.2. Steps in Conducting an FFS**

**Steps in Conducting an FFS**

**1. Preparation**

This stage involves identifying the major agricultural and climate-related problems faced by farmers in the local area. Facilitators analyze issues such as changing rainfall patterns, pests, soil degradation, or poor crop performance. Based on these needs, suitable Climate-Smart Agriculture (CSA) practices—like drought-resistant varieties, water-saving irrigation, soil health practices, and integrated pest management—are selected. Demonstration plots or learning sites are then chosen in farmers' fields to ensure real, practical learning under local conditions.

**2. Implementation**

During this phase, Farmer Field Schools (FFS) conduct weekly or periodic sessions throughout the crop season. Farmers participate in hands-on trials, field observations, agro-ecosystem analysis, and group discussions.

Facilitators guide them through comparing traditional and CSA practices, experimenting with new technologies, and learning by doing. This practical approach builds confidence and deepens understanding.

**3. Learning and Graduation**

Farmers' knowledge, skills, and attitude changes are assessed through participatory evaluation, field performance, and problem-solving activities. At the end of the season, farmers who successfully complete the sessions "graduate" from the FFS. Certificates are awarded to recognize their achievement and encourage continued adoption of CSA practices.

**4. Farmer-Led Diffusion**

Graduated farmers often become resource persons in their villages. They start new FFS groups, demonstrate practices on their own farms, or informally teach friends, neighbours, and community members. This farmer-to-farmer extension accelerates the spread of climate-smart techniques across the region and strengthens local capacity.

**5. Follow-Up**

After graduation, facilitators continue to visit farmers to track how well CSA practices are being adopted. They identify challenges, provide technical backstopping, and help farmers fine-tune their practices. Outcomes, success stories, and lessons learned are documented for future improvements and scaling up of CSA interventions.

**Conclusion**

Farmer Field Schools play a transformative role in promoting climate-smart agriculture and strengthening public awareness of climate change. By combining participatory learning, ecological understanding and practical experimentation, FFS empowers farmers to adapt to climate variability, reduce environmental impacts and build resilient production systems. As climate challenges intensify, the expansion and strengthening of FFS will be essential for ensuring food security, enhancing sustainability and fostering climate-aware rural communities.

**Disclosure Statement**

The authors reported no potential conflict of interest.

**References**

1. Braun, A., & Duveskog, D. (2008). *Farmer Field Schools in Sub-Saharan Africa: Best practices and lessons learned.* FAO.

2. Braun, A., Jiggins, J., Röling, N., van den Berg, H., & Snijders, P. (2006). *A Global Survey and Review of Farmer Field School Experiences.* International Livestock Research Institute.
3. Davis, K. (2006). Farmer field schools: A boon or bust for extension in Africa? *Journal of International Agricultural and Extension Education*, 13(1), 91–97.
4. Davis, K., et al. (2012). Impact of farmer field schools in East Africa. *World Development*, 40(2), 402–413.
5. FAO. (2013). *Climate-Smart Agriculture Sourcebook.* Food and Agriculture Organization.
6. FAO. (2016). *Farmer Field School Guidance Document.* Food and Agriculture Organization.
7. Feder, G., Murgai, R., & Quizon, J. (2004). The farmer field school: Impact on farmers' knowledge and pest management practices. *Economic Development and Cultural Change*, 52(1), 151–175.
8. Friis-Hansen, E., & Duveskog, D. (2012). The empowerment route to well-being: An analysis of farmer field schools in East Africa. *World Development*, 40(2), 414–427.
9. ICAR. (2020). *Impact Assessment of FFS in India.* Indian Council of Agricultural Research.
10. IPCC. (2021). *Climate Change 2021: Impacts, Adaptation and Vulnerability.*
11. Ministry of Agriculture and Farmers' Welfare (MoA&FW). (2018). *National Mission for Sustainable Agriculture: Guidelines.*
12. Nyasimi, M., et al. (2014). Evidence of climate-smart agriculture in Africa. CGIAR–CCAFS.
13. Pretty, J., Toulmin, C., & Williams, S. (2011). Sustainable intensification in African agriculture. *International Journal of Agricultural Sustainability*, 9(1), 5–24.
14. Simpson, B., & Burpee, G. (2014). *Adaptation for smallholder agriculture programme (ASAP) technical guidance.* IFAD.
15. Thornton, P., & Herrero, M. (2010). Potential for reduced methane and nitrous oxide emissions from livestock. *Agricultural Systems*, 103(3), 185–191.
16. van den Berg, H. (2010). *Ten Years of IPM Training in Asia: From Farmer Field School to Community IPM.* FAO.