

Impact of Training and Extension Services on Horticulture Development

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Horticulture-including fruits, vegetables, flowers, ornamentals and nursery crops-has become a vital pillar of agricultural growth, nutrition and livelihood diversification. However, to realize its full potential, producers need access to updated scientific knowledge, improved techniques, and market linkages. That is where training and extension services come into play. They bridge the gap between research-lab

developments and field adoption. This article examines how training and extension services influence horticultural development, what factors affect their effectiveness, challenges and suggestions for improvement.

Role of Training and Extension Services

Knowledge and Skill Transfer

Extension services-through demonstration plots, farmer field schools, workshops and on-farm training-help farmers understand best practices in planting, pest

and disease control, soil health, post-harvest handling, pruning and varietal selection. Training furthers human resource development among extension staff themselves, ensuring they are capable of delivering modern, relevant information. In Punjab, for example,

trained horticultural extension workers from Punjab Agricultural University help motivate farmers to adopt horticulture as entrepreneurial activity.

Technology Adoption

Without training, farmers may not adopt innovations such as improved varieties, integrated pest management (IPM), drip irrigation, shade net / polyhouse technologies or post-harvest technologies. Extension agents act as change agents, allowing these technologies to diffuse. In India, the National Horticulture Mission (NHM) beneficiaries had contact with extension personnel (agricultural assistant, assistant agriculture officer etc.), which correlates with their participation in extension programmes like training, field visits etc.



Improved Productivity, Quality and Income

Better practices reduce losses (especially post-harvest), improve yields and enhance quality (appearance, shelf life). For example, the Transfer of Technology (ToT) programmes of NHRDF (National Horticultural Research and Development Foundation) have resulted in increased productivity and area under horticultural crops by educating farmers using demonstrations, field days etc.

Market Access and Value Chains

Extension services often include training on grading, packing, market norms, negotiation collective marketing, etc., enabling producers to get better prices and access higher value markets. Improved quality through training (post-harvest handling, cleanliness and packaging) allows horticultural produce to meet market / export standards.

Sustainability and Resilience

Training plays a part in disseminating sustainable practices: organic farming, water-conserving methods, integrated pest management, soil-fertility management. Extension can also help farmers adapt to climate change by providing new climate-smart practices, resilient varieties, etc. For example, extension in organic farming helps increase awareness of pest management, soil health, shift to organic practices.

Empirical Evidence / Case Studies

National Horticulture Mission (Karnataka, India)

A study on NHM beneficiaries in found that sources of information for farmers include family, media, internet, etc. They also found that only about 28.5% of beneficiaries were participating in training

programmes, 31% in field visits, ~33% in group meetings / Krishi melas (farmers' fairs). This suggests that while extension contact is present, training reach and participation are lower than optimal.

Horticultural Extension and Training in Punjab, India

In Punjab, data indicates that training and extension education programs (by PAU, KVKs etc.) have played a role in diversifying cropping patterns, raising awareness among farmers, women, and youth, and improving adoption of horticultural crops.

Training Needs of Horticulture Extension Personnel in Jammu & Kashmir

A study in J&K among horticulture extension personnel (HDOs: Horticulture Development Officers; technicians) found that education level, information use are strongly associated with knowledge. Key training areas perceived: insect/pest identification and control, variety identification, nursery management, pruning. Constraints included inadequate staff, facilities, and inconsistent job promotion.

Projects using ICT and Mobile Advisory Services

In India, Nepal, Sri Lanka, pilot projects using cell phone based advisory services (voice, text and photo) have been tried for horticultural crop growers in greenhouses/ shade nets. These aim to deliver real-time, personalized advice. Such approaches, combined with training, help expand reach.

Factors Affecting Effectiveness

Effectiveness of training and extension depends on:

- **Frequency and Quality of Contact:** Regular extension contacts, follow-ups and sustained

support (hand-holding) are more effective than sporadic training.

- **Relevance and Localization:** Training content must match local agro-ecological conditions, crop types, pest/disease pressures and socio-economic conditions.
- **Capacity of Extension Personnel:** Their own training, knowledge, communication skills, competence affect how well they can train farmers. The study in Jammu & Kashmir emphasized that extension personnel valued technical and communication training.
- **Infrastructure and Resources:** Existence of demonstration plots, field days, transportation, communication media and cold storage etc. Without these, knowledge may not translate into practice.
- **Incentives and Institutional Support:** Government policies, funding, institutional frameworks (e.g. Krishi Vigyan Kendras, ATMA and public private partnerships) that support extension strongly.
- **Behavioural, Cultural and Social Barriers:** Farmer risk aversion, traditions, gender norms, literacy level and trust in extension agents etc.

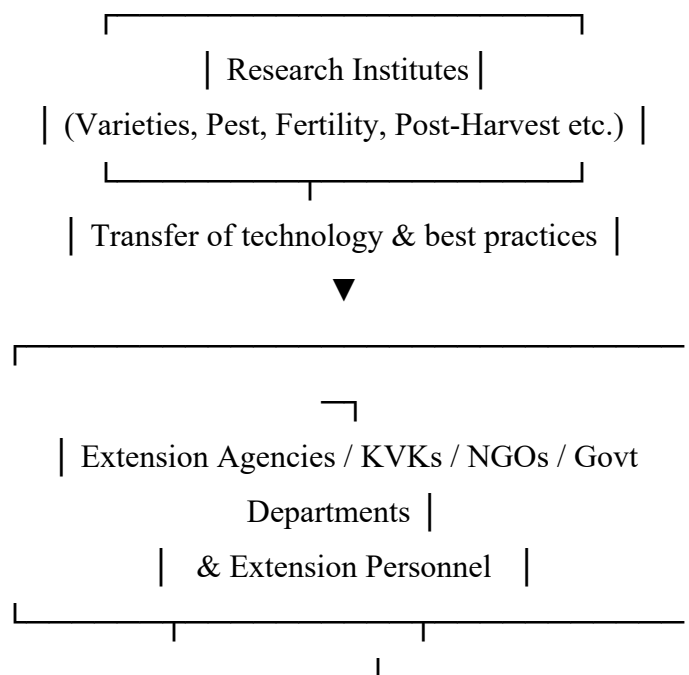
Challenges

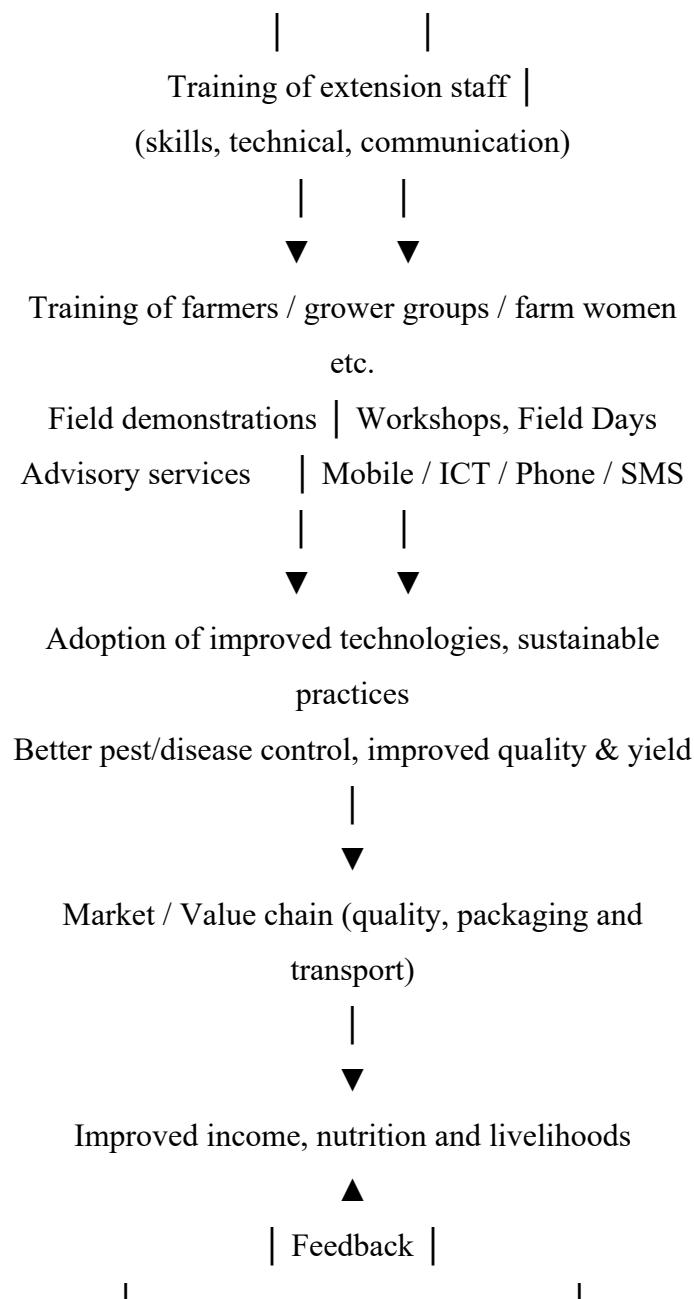
- **Low Participation:** Many farmers do not attend training due to cost, distance, time constraints. In the NHM study in Karnataka, training participation was only ~28.5% among beneficiaries.
- **Inadequate Scale and Reach:** Extension agents often have large areas and many farmers to cover; resource constraints limit reach.

- **Mismatch between Research & Field Reality:** Sometimes technologies developed in research stations may not be adaptive to local contexts (climate, soil and markets).
- **Insufficient Follow-Up / Hand Holding:** Training is often one-off; without follow-ups or support, adoption may drop.
- **Lack of Market Infrastructure and Value Chains:** Even if farmers produce well, if market linkages, packaging, storage are weak, profits may not accrue.
- **Limited Use of ICT and Modern Communication:** While efforts exist (mobile advisory and SMS etc.), digital literacy, network issues, cost etc. remain bottlenecks.

Diagram: Model of Training and Extension Service Flow in Horticulture

Here is a suggested diagram (you can imagine or sketch) of how training and extension services interact in horticultural development:





Impacts / Outcomes

From literature and projects, observed impacts include:

- **Increased Productivity and Area under Horticultural Crops:** Training and extension have led farmers to diversify their cropping into high-value fruit/vegetable/flower crops. E.g. Punjab had low area under horticulture; extension education is aiding diversification.

- **Improved Quality and Reduced Losses:** Better post-harvest handling (sorting, packing), disease/pest control reduce losses, improve shelf-life.
- **Enhanced Income and Livelihoods:** With better yields, quality, market linkage, incomes rise. Training helps farmers access markets.
- **Adoption of Sustainable Practices:** Organic methods, water-efficient irrigation, integrated pest management promoted via extension reduce input cost and environmental impact.
- **Empowerment and Capacity Building:** Particularly for women, youth, marginalized farmers: through training they gain skills, confidence and better decision making.

Policy Implications & Suggestions

To maximize impact, some policy and operational suggestions:

1. **Strengthen Extension Institutions:** Increase number of extension staff, improve their training, supervision and ensure accountability.
2. **Demand-Driven Extension:** Tailor extension to what farmers want / need; involve them in planning.
3. **Use of ICT / Digital Platforms:** Scale up mobile advisory, SMS, apps and social media, video demonstrations. Ensures timely advice and wider reach.
4. **Focus on Post-Harvest, Market Linkages, Value Addition:** Training must include value chain components, not just production.
5. **Continuous Follow-Up / Monitoring & Evaluation:** Do not assume training ends with

workshop. Need follow-ups for adoption, measure impact and refine content.

6. Inclusive Extension: Special attention to smallholders, women, youth and marginalized groups. Ensure accessibility (time, location and cost).

7. Public-Private Partnerships (PPP) and Farmer Producer Organisations (FPOs) can help in scaling, outreach and resource mobilization.

Conclusion

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Training and extension services are foundational to horticulture development. They facilitate technology adoption, improve productivity and quality, enhance income and support sustainable practices. However, their effectiveness depends heavily on quality, relevance, fit to local conditions and strong institutional support. To fully harness horticulture's potential for food security, livelihoods and economic growth, concerted efforts are needed to strengthen and modernize extension systems, especially in developing countries like India.