

## Enhancing Agricultural Productivity and Sustainability: Insights from ATMA Training Initiatives

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### ABSTRACT

Agriculture is a critical sector in India, providing livelihoods for millions while facing challenges such as market volatility, climate change and outdated practices. Training & development programs, notably under the Agricultural Technology Management Agency (ATMA) and the National Mission on Agricultural Extension and Technology (NMAET), are vital in addressing these challenges. This paper examines the role of ATMA and NMAET in advancing agricultural practices through training programs, promoting technology adoption and fostering sustainability. Special attention is given to the inclusion of women farmers and region-specific solutions. Case studies from different regions highlight the success of these initiatives in improving agricultural productivity, resource management and market access. Despite successes, challenges like infrastructure gaps, funding delays and low awareness persist. The study proposes recommendations for enhancing outreach, particularly through digital tools, women-focused programs and public-private partnerships, to ensure sustainable agricultural growth and improved livelihoods for farmers.

**Keywords:** ATMA, Agricultural Training, Technology Adoption, Training & Extension, Women Empowerment and Sustainable Agriculture.

### Introduction

Millions of people in India depend on agriculture for both their livelihood and way of life. Even though the industry is vital to maintaining lives and guaranteeing food security, it nevertheless faces obstacles like market volatility, climate change and antiquated methods. Programs for training and development are crucial in this regard because they give farmers the information and abilities they need

to get beyond these obstacles and adopt sustainable farming methods. Leading programs in India, such as the Agricultural Technology Management Agency (ATMA) and the National Mission on Agricultural Extension and Technology (NMAET), have played a significant role in promoting innovation, closing the knowledge gap and raising agricultural output. This article examines the critical role that training and development play in the

agriculture industry, emphasising the strategic initiatives under NMAET and ATMA.

India's economy still relies heavily on agriculture, which provides a living for a sizable section of the populace. In this regard, the ATMA is essential to the transformation of the extension systems through the integration of participatory planning, farmer-centric services and research. A vital institutional tool for bridging the gap between agricultural innovation and its practical implementation, ATMA was first introduced in 1998 as part of the National Agricultural Technology Project (NATP) [12&20]. As a registered society at the district level, ATMA works in coordination with a number of stakeholders, such as non-governmental organisations, line departments, and Krishi Vigyan Kendras (KVKs). Its main goals are to increase market connections, encourage sustainability and facilitate the adoption of cutting-edge agricultural technologies. With its coverage of all 676 districts in India, the ATMA demonstrates its broad involvement in agricultural extension reform [10&11]. The decentralised and participative nature of ATMA, which entails creating Strategic Research and Extension Plans (SREPs) customised to local agro climatic conditions and farmer requirements, is one of its distinctive features. Farmers are given the ability to actively participate in resource allocation and decision-making through this participatory paradigm. In districts like Rudrapur and Udham Singh Nagar, where agricultural diversity necessitates tailored solutions, ATMA programs have effectively tackled commercial agricultural production and marketing issues in Uttarakhand [7, 18&19]. The organisation has made great progress towards fostering inclusivity, especially by concentrating on under-represented populations like women farmers and smallholders. ATMA has provided women farmers with access to financial resources, entrepreneurial opportunities, and cutting-edge agricultural technologies through Farmer Interest Groups (FIGs) and capacity-

building initiatives [13&15]. These initiatives support the country's objectives of encouraging sustainable practices and doubling farmer earnings [5&20]. Notwithstanding its achievements, ATMA still has issues that restrict its overall efficacy; these consist of gaps in stakeholder cooperation, bureaucratic hold-ups and resource limitations. Furthermore, regional differences in farmer awareness and involvement underscore the necessity of more robust outreach and engagement tactics [3&4]. To improve ATMA's influence on rural livelihoods, sustainability and agricultural output, these obstacles must be removed [14–16]. This paper evaluates ATMA's structure, objectives and contribution to the advancement of Indian agriculture. It focuses on the agency's effectiveness in training programs, encouraging women's participation and tackling region-specific agricultural challenges. By analyzing case studies and outcomes, the study underscores ATMA's role as a model for extension system reforms and its potential to promote inclusive agricultural growth [6&18].

The objectives of this study are to examine the role of NMAET and ATMA in fostering sustainable agriculture, evaluate the impact of training programs on technology adoption and resource management, highlight success stories and analyze case studies showcasing the outcomes of ATMA initiatives and identify challenges while proposing recommendations to enhance efficiency and outreach.

### **Methodology**

This study relies exclusively on secondary data sources, including government reports, policy documents and publications related to NMAET and ATMA. Research articles, journals and case studies were reviewed to assess the impact of these programs on agricultural development. Additionally, credible online resources from agricultural institutions, Krishi Vigyan Kendras (KVKs) and related agencies were analyzed to gather insights into training initiatives, success stories and challenges faced in implementation.

## Discussions

### The Role of Training in Agriculture

Training in agriculture extends beyond imparting technical knowledge, empowering farmers to adopt modern technologies such as mechanization, precision farming and climate-resilient techniques. It enhances resource management by promoting the efficient use of water, fertilizers & seeds and strengthens market linkages by improving awareness of pricing strategies and value addition. Well-designed training programs cater to diverse needs, including crop production, pest management and marketing, while fostering inclusivity by encouraging women's participation and empowering marginal farmers [7].

### NMAET: Revolutionizing Agricultural Training and Extension

The National Mission on Agricultural Extension and Technology is a comprehensive framework aimed at improving the reach and impact of agricultural extension services. The mission is structured around four sub-missions, each addressing a specific aspect of agricultural development with a focus on training and capacity building:

The Sub Mission on Agricultural Extension (SAME): The program adopts a farmer-driven participatory model, emphasizing skill development through workshops and capacity-building for Block Technology Team (BTTs), while leveraging digital tools and complementary initiatives like ATMA, Mass Media Support, ACABC and Kisan Call Centres to promote sustainability & productivity.

The Sub-Mission on Seed and Planting Material (SMSP) focuses on improving seed quality and availability: SMSP ensures the availability of high-quality seeds by promoting certified seeds through seed replacement, establishing seed villages for localized production, and supporting innovation in hybrid seed technology.

The Sub Mission on Agricultural Mechanization (SMAM): The program enhances productivity through mechanization, offers hands-on training for machinery operation, provides access to equipment via custom hiring centres, and supports region-specific machines with subsidies and testing centres to promote sustainable practices.

The Sub-Mission on Plant Protection and Plant Quarantine (SMPP) ensures crop health & bio-security: The program promotes sustainability through Integrated Pest Management, enhances disease detection skills via plant health diagnostics, strengthens pest surveillance systems, and upgrades quarantine facilities to ensure crop safety and food security [17,

### ATMA: A Paradigm Shift in Extension Services

21&22].

The Agricultural Technology Management Agency (ATMA) has become a pivotal force in transforming agricultural extension services in India by decentralizing operations and prioritizing farmer-centric approaches. ATMA was first introduced as a pilot project under the Innovations in Technology Dissemination (ITD) component of the National Agricultural Technology Project (NATP). Implemented between 1998 and 2005, it covered 28 districts across seven states: Uttar Pradesh, Bihar, Himachal Pradesh, Andhra Pradesh, Maharashtra, Odisha, and Punjab. This pilot aimed to test innovative extension methods, encourage participatory approaches and bridge the gap between research institutions and farming communities. Following its success, ATMA was expanded into a national scheme in 2004-05. Since its launch, ATMA has achieved significant growth, extending its reach to 588 districts in 2005, 676 districts by 2014, 691 districts as of 2021-22 and currently covering 739 districts across India, with a cumulative budget allocation of Rs. 7,469.68 crore up to December 2023 and Rs. 434.15 crore disbursed

to states in the 2023-24 fiscal year, ATMA has emerged as one of the largest agricultural extension networks. It has mobilized 6,092 Block Technology Teams (BTTs), strengthening the connection between research institutions, extension services and farmers [1, 2, 7, 17, 21&22].

ATMA promotes good agricultural practices and empowers farmers through initiatives like Farm Schools for peer learning, Front Line Demonstrations, Exposure Visits for knowledge sharing, and Farmers Fairs and Seminars for networking. It offers training programs, skill development tours and publishes agricultural resources to educate farmers. The scheme strengthens farmer groups, encourages private sector partnerships for holistic growth and boosts women's involvement in agriculture. By improving research-extension-farmer-market linkages, ATMA has made extension services more inclusive, technology-driven and participatory, advancing sustainable agricultural development across India. The ATMA organizational structure is designed for efficiency across multiple levels. At the district level, the Governing Board (GB) and ATMA Management Committee (AMC) oversee operations, while at the block level, Block Technology Teams (BTTs) and Farmer Advisory Committees (FACs) implement activities. At the village level, Farmer Interest Groups (FIGs) and collaborations with public, private, NGO and Para-agencies strengthen grassroots impact. Farm Information and Advisory Centres (FIACs) are key in disseminating advanced technologies and practices, establishing ATMA as a crucial driver of agricultural transformation. This structure ensures effective knowledge transfer and promotes sustainable farming aligned with local and government needs. [17, 20&21].

#### Success Stories in Training under ATMA

Beekeeping in Bihar: Farmers trained under ATMA have achieved success in beekeeping, with some earning over ₹2 lakh annually. In

Muzaffarpur, Bihar, Ms. Anita Kushwaha started her beekeeping journey in 2004-05 with support from the BTT of Rajendra Agricultural University (RAU), PUSA, Samastipur. With an initial investment of ₹5,000 for two beekeeping boxes and other expenses, she gradually expanded to 250 boxes, significantly increasing her productivity. Her efforts yielded a net income of ₹2 lakh per year. Recognized by the Bihar Agriculture Management Extension Training Institute, she was honoured for promoting beekeeping as a viable agri-enterprise for rural youth and contributing to rural entrepreneurship [19].

Natural Farming in Himachal Pradesh; Enhancing Apple Production through Subhash Palekar's Techniques: Through ATMA training, farmers have successfully adopted Subhash Palekar Natural Farming (SPNF), yielding impressive outcomes. One apple grower increased production from 450 to 650 boxes while cutting costs by switching from chemical inputs to organic methods. Adding companion crops like peas and cauliflower further enhanced his income by ₹1 lakh annually. This highlights how SPNF, supported by ATMA, has enabled farmers to enhance productivity while embracing sustainability. In Mandi district, training programs have motivated farmers to transition to chemical-free farming practices [29].

Women Farmers Lead the Way with Indira Rana's Initiative: Indira Rana and her women's group have become a great example by adopting natural farming with the support of ATMA training programs. By removing chemical fertilizers and pesticides, they have reduced cultivation costs and improved crop quality. Using natural inputs like cow dung, urine and local plant extracts, they have enriched soil health and promoted sustainable farming. These women farmers now serve as role models, proving that eco-friendly farming can also be financially rewarding [27&29].



Precision Farming in Tamil Nadu: ATMA initiatives have helped farmers in Madurai enhance resource efficiency by adopting precision farming techniques. Registered under the Madurai Farmers Association, these farmers have integrated technologies such as drip irrigation, soil testing and crop monitoring to optimize resources. In collaboration with KVKs in Madurai, they receive expert guidance and technical support. Techniques like GPS-based soil mapping and crop-specific nutrient management have led to higher yields and reduced input costs. The association also provides services such as equipment rentals, workshops and market linkages, ensuring access to modern tools and profitable markets. Farmers from Usilampatti and Melur exemplify the success of this initiative. By connecting research with practical application, ATMA and the farmers association have empowered Madurai's agricultural community to adopt sustainable and profitable practices [23, 24, 26, 27&28].

### **Challenges in Training Implementation**

According to a study by Naidu et al. from Tamil Nadu Agricultural University highlighted several constraints faced by stakeholders under ATMA. Extension officials struggled with inadequate financial support and the absence of a district-level chairman with a technical agriculture background, affecting decision-making and coordination. Farmers on the other hand, faced challenges like the unavailability of production inputs at their doorstep and a demand for training on improved technologies from neighbouring regions, emphasizing the need for more localized extension services [3&12]. Additionally, infrastructure gaps, funding delays, and low awareness levels hindered the effectiveness of training programs [13].

Overcoming these challenges requires cooperation between government agencies, private sector stakeholders and grassroots organizations.

To improve the effectiveness of NMAET and ATMA, upgrading rural training centres and introducing mobile units can enhance accessibility. Streamlined funding and decentralized management are crucial for timely execution. Awareness campaigns in regional languages, along with digital tools like mobile apps and AI platforms, can increase outreach and provide real-time support. Women-focused initiatives, such as tailored training and financial incentives, can empower female farmers. Region-specific training on water conservation, pest management, and sustainable practices is vital. Public-private partnerships can bring expertise, funding, and collaboration at the grassroots level. Effective monitoring, incorporating farmer feedback and policy refinements, including tax benefits for providers and integrated farmer databases, can boost scalability & sustainability [3, 7&13].

### **Benefit of Training in Agri Sector**

Training programs in agriculture play a pivotal role in enhancing farmers skills and productivity. They enable the adoption of modern farming practices, leading to higher crop yields and efficient resource use, including water, fertilizers and seeds. Farmers gain exposure to advanced technologies like precision farming, mechanization and biotechnology, which boost productivity while reducing costs. Emphasis on eco-friendly techniques such as organic farming, integrated pest management (IPM) and water conservation fosters sustainable practices.

These programs also improve resource management by optimizing inputs to minimize waste and environmental impact. Market-oriented training educates farmers on trends, demand forecasting & value additions, helping them make informed decisions and access broader markets. Financial literacy sessions empower farmers to manage income, save & secure credit for farm investments. Enhanced knowledge in crop selection, pest control and post-harvest management improves profitability

and income. Risk management training prepares farmers for uncertainties like climate change through diversification, insurance and disaster planning. Specialized initiatives for women farmers promote gender inclusivity and decision-making. Workshops and exposure visits provide networking opportunities, fostering peer learning and the exchange of knowledge. Additionally, well-trained extension agents ensure timely delivery of accurate agricultural information. Overall, these programs build self-reliance, fostering entrepreneurship in agribusiness ventures like food processing and value-added products. These training initiatives improve farmer's productivity, profitability, and sustainability, leading to enhanced livelihoods and long-term growth in agriculture. ATMA's efforts significantly contribute to better farming practices, higher yields and sustainable livelihoods for farmers nationwide. [4,8,9,15&21].

## Conclusion

Training and development programs under initiatives like NMAET and ATMA have played a transformative role in Indian agriculture by equipping farmers with the skills and knowledge to adopt modern technologies and sustainable practices. These initiatives have not only bridged the gap between traditional methods and innovative approaches but have also empowered farmers to make informed decisions, enhance productivity and improve resource management. Successful case studies such as beekeeping in Bihar and precision farming in Tamil Nadu underscore the tangible impact of these programs on farmer incomes, productivity and market access.

However, challenges such as inadequate infrastructure, financial constraints and low awareness continue to hinder the full impact of these programs. Addressing these issues through investments in rural infrastructure, streamlined funding processes and targeted awareness campaigns is crucial. To further enhance the inclusiveness and effectiveness of agricultural

training, future programs should integrate digital technologies like mobile apps and AI systems, provide region-specific training, and emphasize women-centric initiatives to empower female farmers. By embracing these strategies, agricultural growth in India can become more sustainable, inclusive & resilient, benefiting farmers, the agricultural sector and the broader economy. Strengthening these training programs will not only improve livelihoods but also contribute to the long-term success of India's agricultural transformation.

## References:

- ATMA Guidelines, 2014 under NMAET. Guidelines for the centrally sponsored scheme "national mission on agricultural extension and technology (NMAET)" to be implemented during the XII plan. Department of Agriculture and Cooperation, Govt. of India. 2014. <https://diragri.mu.nic.in/cssguidelines/smae.pdf>
- Agricultural Technology Management Agency, NATP Series-Agricultural Technology Management Project. 1-14. <https://www.manage.gov.in/publications/series2.pdf>
- Bortamuly, D., & Khuhly, B. L. (2013). Constraints faced by block level extension functionaries in facilitating commodity interest groups and farm schools under ATMA in NE Indian states. *Journal of Academia and Industrial Research*, 2(5), 291-294.
- Chandra, N. H. S., Kadian, K. S., & Kale, R. B. (2017). Identifying the Factors Affecting Coordination among Different Agencies with ATMA in Andhra Pradesh, India. *Int. J. Curr. Microbiol. App. Sci*, 6(11), 890-899.
- Chouhan, S., Singh, S. R. K., Pande, A. K., Gautam, U. S., & Mishra, S. (2012). Assessing Differential Knowledge Level Apropos Improved Sugarcane Cultivation Practices in Madhya

- Pradesh. Indian Journal of Extension Education, 48(1&2), 95-97.
- Debnath, A., Saravanan, R., & Datta, J. (2014). Job competence and job performance of the extension personnel of the department of agriculture in Tripura State of North-East India. *International Journal of Social Sciences*, 3(2), 91-112.
- Deka, C., Mishra, P., & Baruah, R. (2017). Organizational Level Performance of Agricultural Technology Management Agency (ATMA) under New Extension Reforms in the State of Assam. *Asian Journal of Agricultural Extension, Economics & Sociology*, 19(2), 1-7.
- Guidelines for Support to State Extension Programmes for Extension Reforms (ATMA) Scheme, 2018. Directorate of Extension Department of Agriculture, Cooperation & Farmers Welfare Ministry of Agriculture & Farmers Welfare Government of India, 104. <https://extensionreforms.da.gov.in/PDF/atmaguid23814.pdf>
- Kumar, S., Mazher, S. H. & Bose, D. K., 2016. Role Performance and Relationship between the Selected Characteristics of the Respondents towards Farm School of Agricultural Technology Management Agency (ATMA). *International Journal of Humanities and Social Science Invention*. 5(2), 1-4.
- Kudari, M. B. (2023). Constraints faced by the extension personnel in implementation of the Agricultural Technology Management Agency programme (ATMA). *International Journal of Statistics and Applied Mathematics*, SP-8(6), 1352-1355.
- Mishra, S. (2024). Impact of agricultural technology management agency (ATMA) on livelihood of farm women: A review. *Indian Journal.com*, 19(1), 1-8. DOI: 10.5958/2231-6736.2024.00001.2
- Naidu, J. Y. N., Philip, H., Asokhan, M., Balasubramanian, R., & Duraisamy, M. R. (2017). Constraints Faced by Stakeholders under Agriculture Technology Management Agency (ATMA). *Journal of Extension Education*, 28(4), 5768-5774.
- Panda, S., & Pal, P. K. (2020). Constraints Faced by Block Level ATMA Functionaries in Providing Pluralistic Extension Services in the Cooch Behar District of West Bengal. *Int. J. Curr. Microbiol. App. Sci*, 9(11), 430-434.
- Panda, S., Modak, S., & Pal, P. K. (2022). Assessing the Quality of Pluralistic Extension Service Provided by KVK and ATMA in Cooch Behar District of West Bengal. *Journal of Agriculture and Technology*, 9(1&2), 1-4.
- Premavathi, R. & Kalaivani, S. 2016. Impact Assessment of Exposure Visits and Feedback of ATMA Stakeholders. *International Journal of Information Research and Review*, 03 (05), 2289-2293.
- Ranaware, A. R. Kolgane, B. T., & Kolgare, D. T. 2012. Correlative study on involvement of representative farmers of ATMA. *Agricultural Update* 7(3&4), 179-183.
- Revised ATMA Guideline. Guidelines for modified "Support to State Extension Programmes for Extension Reforms" scheme, 2010. New Delhi: Ministry of Agriculture, Department of Agriculture and Cooperation; 2010.
- Saikia, D. (2021). A Mixed-Method Analysis on Effectiveness of Information Flow Mechanism Among the Stakeholders of Post T&V System and ATMA Model in Assam (Doctoral dissertation, AAU, Jorhat).
- Singh, D. K., & Singh, P. (2014). Study of Effective implementation of Agricultural Technology Management Agency through case studies in Bihar. *International Journal of Agriculture, Environment and Biotechnology*, 7(1), 173-178.

Singh, K. M., Meena, M. S., Singh, R. K. P., Kumar, A. & Kumar, U. (2009). Agricultural Technology Management Agency (ATMA): A study of its impact in pilot districts in Bihar, India. MPRA, ICAR-RCER, Patna, 45549.

Websites:

Agricultural Technology Management Agency (ATMA) Scheme, 2019. Accessed on 25-11-2024. <https://www.indiafilings.com/learn/agricultural-technology-management-agency-atma-scheme/>.

Annual Report 2023-24. Department of Agriculture & Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Government of India. Accessed on 25-11-2024. [https://agriwelfare.gov.in/Documents/AR\\_English\\_2023\\_24.pdf](https://agriwelfare.gov.in/Documents/AR_English_2023_24.pdf)

Format for Details of Successful Farmers Theme of the Success Story in Agriculture & Allied. Sectors Agriculture. [http://www.atmasahibganj.in/23-06-14/success/01\\_SUCCESS\\_STORY\\_OF\\_ATMA\\_SAHIBGANJ\\_11\\_Success\\_Story\\_.pdf](http://www.atmasahibganj.in/23-06-14/success/01_SUCCESS_STORY_OF_ATMA_SAHIBGANJ_11_Success_Story_.pdf)

List of Registered Farmers Association – Madurai. Accessed on 25-11-2024. [https://agritech.tnau.ac.in/farm\\_association/pdf/Registered%20Farmers%20Association-%20Madurai.pdf](https://agritech.tnau.ac.in/farm_association/pdf/Registered%20Farmers%20Association-%20Madurai.pdf)

SAMETIATC, October 2024. Accessed on 25-11-2024.

[https://www.sametiwb.org/?tab=success\\_story\\_district](https://www.sametiwb.org/?tab=success_story_district).

Success Story of ATMA, ICAR – MAFW, 2024. Accessed on 25-11-2024. <https://icar.org.in/node/15017>.

Success Story, ATMA Directorate and SAMETI, AFWCD, GOG, 2024. Accessed on 25-11-2024. <https://atma.gujarat.gov.in/Home/NaturalFarmingSuccessStory>

[https://www.atmasahibganj.in/success/3%20-%20Khoob%20Lal%20Pandit%20\[BO RIO\].pdf](https://www.atmasahibganj.in/success/3%20-%20Khoob%20Lal%20Pandit%20[BO RIO].pdf) .

<https://spnfhp.nic.in/SPNF/en-IN/index.aspx>