



Agricultural Education & Training in India

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Agriculture provides the primary livelihood for nearly half of India's population and contributes about 18 percent of GDP. Building human capacity, through higher education, research, and hands-on training, is vital for raising productivity, reducing costs, and achieving national goals. Agricultural education, research, and extension are recognised as the key pillars of the sector, forming the institutional and scientific base essential for sustaining the targeted 5 percent agricultural growth rate and achieving the national vision of "Viksit Krishi aur Samruddh Kisan" (Developed Agriculture and Prosperous Farmer)-the core philosophy of "Viksit Bharat". To achieve this vision, these three pillars must work in synergy under the guiding principle of "One Nation – One Agriculture – One Team."

Indian Council of Agricultural Research (ICAR)

- **Apex body for agri research and education:** Indian Council of Agricultural Research (ICAR), established in 1929 (under the Department of Agricultural Research and Education, Ministry of Agriculture and Farmers Welfare), is India's premier organization for coordinating agricultural research and higher education. It is responsible for guiding research institutes and universities in agriculture, horticulture, fisheries, and animal sciences.
- **Nationwide network:** ICAR oversees a vast system, 113 national research institutes(a detailed list can be accessed here <https://icar.org.in/institutes>) and 74 agricultural universities across India, making it one of the world's largest agri research networks. It spearheaded the Green Revolution and continues to lead in developing climate-resilient, high-yield varieties and farming technologies.
- **Extension and quality:** Through its divisions, ICAR manages 731 Krishi Vigyan Kendras (KVKs) to transfer technologies to farmers. It also sets academic standards, issuing the 'ICAR Model Act (Revised 2023)' and 'Minimum Requirements for Establishing the Agricultural Colleges', and accredits institutions via the National Agricultural Education Accreditation Board.

Public and Private Institutions

Government universities and institutes: India has 63 State Agricultural Universities (SAUs), 3 Central Agricultural Universities (CAUs) (Pusa, Imphal, Jhansi), 4 "Deemed" universities (IARI-Delhi, NDRI-Karnal, IVRI-Izatnagar, CIFE-Mumbai), and 4 Central Universities with agriculture faculty. The ICAR network also includes 11 ATARI (Agricultural Technology Application Research Institutes) centres.

Private sector: Agricultural education falls under the purview of State Governments, which have their own policies for establishing and promoting private institutions. ICAR's role is limited to granting accreditation upon request. Over the past five years, the number of ICAR-accredited private agricultural colleges has risen from 5 in 2020–21 to 22 by 2024–25.



Central Agricultural Universities

Currently, three Central Agricultural Universities (CAUs) operate in India. Each was created by an Act of Parliament to serve regional needs:

- **Dr. Rajendra Prasad CAU, Pusa (Bihar):** Converted to a CAU in October 2016 from the former Rajendra Agricultural University (Estd. 1970). It has 8 constituent colleges:
 1. Tirhut College of Agriculture
 2. Post Graduate College of Agriculture
 3. College of Agricultural Engineering and Technology
 4. College of Community Science
 5. College of Basic Sciences and Humanities
 6. College of Fisheries
 7. Pt. Deen Dayal Upadhyay College of Horticulture and Forestry
 8. School of AgriBusiness & Rural Management

RPCAU offers undergraduate programs in 8 disciplines (Agriculture, Horticulture, Agricultural Engineering, Community Science, Fisheries, Biotechnology, Forestry & Food Technology). Additionally, the university also offers a wide range of Master's Programmes, and Ph.D. The university operates through multiple campuses, at Pusa in Samastipur District, Dholi in Muzaffarpur District, and Piprakothi in East Champaran District of Bihar, and manages 18 KVKs, linking research with farmers in Bihar. Aligned with the National Education Policy, the university has launched several short-term certificate and diploma programmes aimed at developing industry-ready talent at grassroots and mid-management levels.

- **Central Agricultural University, Imphal (Manipur):** Established in January 1993 under the Central Agricultural University Act, 1992, the university serves seven Northeastern hill states,

Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Sikkim, Nagaland, and Tripura. CAU, Imphal follows a comprehensive approach by integrating teaching, research, and extension across its 13 constituent colleges located throughout the seven hill states (the complete list available at, <https://cau.ac.in/about-cau-imphal/>). It currently offers 10 undergraduate, 48 master's, and 34 Ph.D. programmes in agriculture and allied disciplines, with a total enrolment of 2982 students in the academic year 2024-25.

- **Rani Lakshmi Bai CAU, Jhansi (Uttar Pradesh):** Established as an Institution of national importance under the Department of Agricultural Research and Education (DARE) by an Act of Parliament (Act No. 10 of 2014). The university serves as a centre of excellence in agricultural sciences, dedicated to advancing education, research and extension services in India. RLBCAU's curriculum designed to equip students of undergraduate, master's and Ph. D. with latest knowledge and skills under varied discipline of agronomy, horticulture, veterinary science, and agricultural engineering etc. Its constituent colleges include College of Agriculture and College of Horticulture & Forestry at Jhansi (UP), and Colleges of Fisheries and College of Veterinary & Animal Sciences at Datia (Madhya Pradesh).

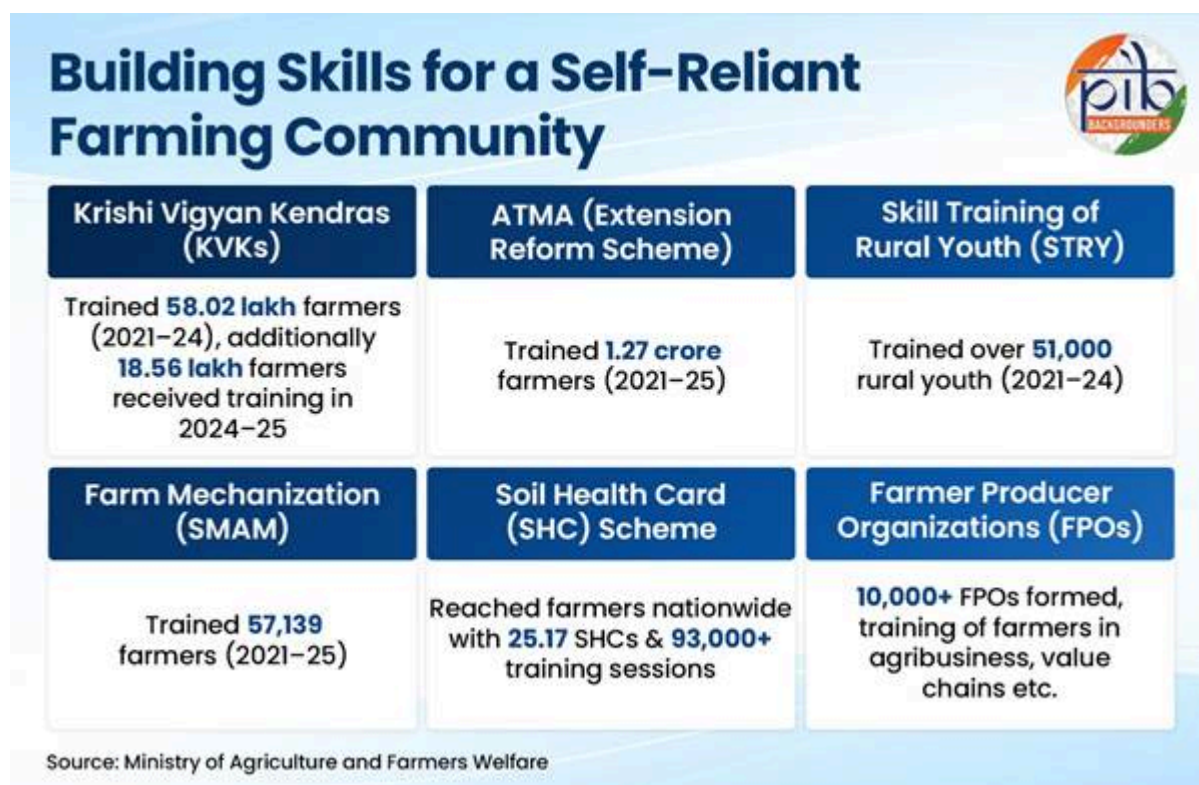
Internet of Things (IoT) and Artificial intelligence (AI) in Agriculture

- **Technology Adoption:** The government is actively promoting the Internet of Things (IoT) and Artificial Intelligence (AI) to modernize farming. Applications include precision farming (sensor-driven irrigation, automated machinery), drones for imaging and spraying, livestock monitoring, climate-smart greenhouses, AI-driven pest/crop monitoring, and remote sensing.
- **Innovation Hubs:** Under DST's National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS), 25 Technology Innovation Hubs (TIHs) were set up nationwide as of Dec 2022; three focused in the application of IoT and AI in agriculture. For example, IIT Ropar's Agri/Water TIH, working on IoT sensors for saffron production and supply all over India. IIT Bombay hosts a TIH on "Internet of Everything," and IIT Kharagpur runs an AI4ICPS hub for AI/ML solutions (crop health forecasting, yield prediction).
- **Digital Infrastructure:** The Ministry of Electronics has established Centres of Excellence on IoT in cities like Bengaluru, Gurugram, Gandhinagar and Visakhapatnam. The Visakhapatnam IoT Centre of Excellence (CoE), for instance, focuses on agri-tech and connects startups, industry, investors, and academia to democratize innovation. Under the National e-Governance Plan for Agriculture, states are funded to implement digital-agriculture projects using AI/ML, IoT, blockchain, etc.

Start-up Ecosystem: Since 2018–19, the "Innovation and Agri-Entrepreneurship Development" programme under the Rashtriya Krishi Vikas Yojana (RKVY) has been fostering innovation and agripreneurship by offering financial assistance and strengthening the agri-incubation ecosystem. The initiative supports start-ups in agriculture and allied sectors, with the dual aim of boosting farmers' incomes through new opportunities and generating employment for rural youth. Start-ups supported under the programme are engaged across diverse areas of agriculture and allied sectors, including agro-processing, food technology and value addition, artificial intelligence (AI), the Internet of Things (IoT), information and communication technology (ICT), precision farming, digital agriculture, blockchain technology.

Skilling and Training of Farmers

Skilling and training of farmers have become central to India's agricultural transformation. Recognising that modern farming requirements, the Government has prioritised capacity building to help farmers adapt to technological innovations, climatic and market transformations. Programmes such as the Skill Training of Rural Youth (STRY), Sub-Mission on Agricultural Mechanization (SMAM), Pradhan Mantri Kaushal Vikas Yojana (PMKVY), and initiatives through Krishi Vigyan Kendras (KVKs) and Agricultural Technology Management Agency (ATMA) are equipping farmers with practical knowledge and vocational expertise for sustainable agriculture practices.



- **Krishi Vigyan Kendras (KVKs):** These ICAR-run centers are the frontline for farmers training. Between 2021–22 and 2023–24, KVKs trained 58.02 lakh farmers with the number increasing consistently each year. In the first ten months of 2024–25, an additional 18.56 lakh farmers had already been trained. KVK courses cover improved agronomy, livestock care, soil health, post-harvest tech, etc., tailored to local conditions.
- **ATMA (Extension Reform Scheme):** The Agriculture Technology Management Agency (ATMA) scheme plays a key role in strengthening decentralized agricultural extension. Under this initiatives, 32.38 lakh farmers were trained in 2021–22, followed by 40.11 lakh in 2022–23 and 36.60 lakh in 2023–24. By January 2025, nearly 18.30 lakh farmers had been trained. Overall, nearly 1.27 crore farmers have been trained through ATMA during 2021–25.
- **Skill Training of Rural Youth (STRY):** STRY provides short vocational courses (about seven days) in agri/allied trades (horticulture, dairy, fisheries, etc.). It trained 10,456 rural youth in 2021–22, 11,634 in 2022–23 and 20,940 in 2023–24. As of Dec 2024, over 51,000 rural youth have been trained since 2021. The program aims to boost self-employment and create skilled manpower in villages.
- **Farm Mechanization (SMAM):** The Sub-Mission on Agricultural Mechanization (SMAM) provides training on farm machinery use. During 2021–25, SMAM directly trained 57,139 farmers in mechanization through demonstrations and custom hiring awareness.

- **Soil Health Card Scheme:** This program issues soil health cards and educates farmers on balanced fertilization. By July 2025, over 25.17 crore cards had been distributed nationwide. Parallel efforts included 93,000+ soil-health trainings and 6.8 lakh on-field demonstrations to teach nutrient management practices.
- **Farmer Producer Organizations (FPOs):** To build market-oriented capacity, the government has registered over 10,000 FPOs. Through digital modules and webinars, farmers in FPOs receive training on agri-business management, value chains and marketing. (By collectivizing smallholders, FPOs help deliver targeted skilling and extension in rural areas).

Conclusion

India's agricultural education and training system today reflects a well-integrated approach linking education, research, technology, and field-level skill development. Guided by the vision of "One Nation – One Agriculture – One Team," institutions such as ICAR, Central and State Agricultural Universities, and Krishi Vigyan Kendras have created a strong foundation to make farming more productive, sustainable, and knowledge-driven. The continuous emphasis on quality education, accreditation reforms, and farmer-centric training is helping bridge the gap between scientific research and practical application.

The inclusion of technologies like the Internet of Things (IoT), Artificial Intelligence (AI), and precision farming tools marks a significant shift toward modern and data-based agriculture. Through initiatives like ATMA, STRY, and SMAM, farmers and rural youth are being equipped with essential technical and entrepreneurial skills, fostering employment and self-reliance in villages. Together, these efforts are contributing to higher productivity, better incomes, and sustainable use of resources. As India aims for self-reliance in food production and a resilient rural economy, strengthening this synergy between education, innovation, and skilling will remain central to the nation's agricultural progress.

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