Indian Council of Agricultural Research (ICAR) - Complete Documentation

Portal: https://www.indiascienceandtechnology.gov.in/organisations/ministry-and-departments/indian-council-agricultural-research-icar

Organization: Indian Council of Agricultural Research (ICAR), Ministry of Agriculture & Farmers Welfare, Government of India

Document Date: March 1, 2026

Executive Summary

The Indian Council of Agricultural Research (ICAR) is India's apex research organization and the world's largest national agricultural research system, with a distinguished international standing for spearheading agricultural research, education, and extension activities[1][2]. Established on July 16, 1929, as the Imperial Council of Agricultural Research during British rule, ICAR has evolved into an autonomous body under the Department of Agricultural Research and Education (DARE), Ministry of Agriculture & Farmers Welfare, coordinating agricultural education and research across the nation[3][4].

ICAR operates through a vast network comprising 101 research institutes, 71 agricultural universities, and 731 Krishi Vigyan Kendras (KVKs) spread across India, making it one of the most extensive agricultural research and education systems globally[5][6]. The Union Minister of Agriculture serves as ICAR's president, reflecting the organization's strategic importance to national food security and agricultural development.

The Council's primary mandate focuses on eight thematic areas: Crop Science, Horticultural Science, Natural Resource Management,

Agricultural Engineering, Animal Science, Fisheries Science, Agricultural Education, and Agricultural Extension[7]. Through its comprehensive approach encompassing research innovation, human resource development, technology transfer, and policy advisory, ICAR has been instrumental in transforming Indian agriculture from food deficit to food surplus, enhancing farmer incomes, promoting sustainable resource management, and ensuring nutritional security for India's growing population.

ICAR Vision 2050 provides the strategic framework for innovation-led inclusive and sustainable agricultural growth, positioning Indian agriculture to meet future challenges of population growth, climate change, resource constraints, and evolving nutritional demands[8].

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1. Historical Background and Establishment

1.1 Foundation During British Era

Establishment Date: July 16, 1929[9][10]

Original Name: Imperial Council of Agricultural Research

Founding Context:

The Imperial Council of Agricultural Research was established in pursuance of the report of the Royal Commission on Agriculture, which recognized the critical need for organized agricultural research in India[11]. During the British colonial period, agriculture was the backbone of the Indian economy, yet scientific research and systematic experimentation were largely absent.

Registration: The organization was established as a registered society under the Societies Registration Act, 1860[12].

1.2 Post-Independence Transformation

Following India's independence in 1947, the Imperial Council of Agricultural Research was renamed the **Indian Council of Agricultural Research (ICAR)** to reflect India's sovereignty and national vision for agricultural development[13].

Key Transformation Elements:

- Shift from colonial research priorities to nation-building objectives
- Focus on food self-sufficiency and agricultural productivity
- Establishment of comprehensive agricultural education system
- Integration of research with extension for farmer benefit
- Creation of national network of research institutes and universities

1.3 Evolution Over Nine Decades

1929-1947 (Imperial Era):

- Limited research on selected crops and regions
- Focused primarily on commercial crops for export

1947-1970 (Foundation Building):

- Expansion of research institutes across India
- Establishment of agricultural universities
- Introduction of high-yielding varieties during Green Revolution

1970-2000 (Consolidation and Diversification):

- Strengthening of National Agricultural Research System (NARS)
- Diversification into horticulture, animal science, and fisheries
- Creation of KVK network for technology dissemination

2000-Present (Modern Innovation Era):

- Integration of biotechnology and molecular biology
- Emphasis on climate-resilient agriculture
- Digital agriculture and precision farming
- Farmer-centric research and participatory approaches
- Focus on nutritional security beyond food security

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2. Organizational Structure and Governance

2.1 Administrative Framework

Parent Ministry: Department of Agricultural Research and Education (DARE), Ministry of Agriculture & Farmers Welfare, Government of India[14]

Legal Status: Autonomous organization functioning as a registered society

Headquarters: Krishi Bhavan, New Delhi - 110001, India (primary location)[15]

Additional Headquarters: Krishi Anusandhan Bhawan-I and Krishi Anusandhan Bhawan-II, Pusa Campus, New Delhi - 110012

2.2 Leadership Structure

President: Union Minister of Agriculture & Farmers Welfare, Government of India[16]

Secretary (DARE) & Director General (ICAR):
Dr. Mangi Lal Jat

- Phone: +91-11-23388991-9
- Email: dg.icar@nic.in

Additional Secretary (DARE) & Financial Advisor (ICAR):
Sh. Sandeep Sarkar

- Phone: +91-11-23384360
- Fax: +91-11-23389388
- Email: asfa.icar@gov.in

2.3 Deputy Directors General (Thematic Divisions)

ICAR operates through eight specialized divisions, each headed by a Deputy Director General:

Division	DDG	Contact
Crop Science	Dr. DK Yadav	+91-11-23382545
Horticultural Science	Dr. Sanjay Kumar Singh	+91-11-25842068
Animal Science	Dr. Raghavendra Bhatta	+91-11-23381119
Fisheries Science	Dr. Joykrushna Jena	+91-11-25846738
Natural Resource Management	Dr. AK Nayak	+91-11-25848364
Agricultural Engineering	Dr. SN Jha	+91-11-25843415
Agricultural Extension	Dr. Rajbir Singh	+91-11-25843277
Agricultural Education	Dr. Joykrushna Jena (Addl.)	+91-11-25841760

Table 1: ICAR Deputy Directors General by Division

2.4 Assistant Directors General

ICAR has **24 Assistant Directors General (ADGs)** responsible for specific commodity/subject areas within the larger thematic divisions[17].

2.5 Governance Bodies

The Council:
The apex body for coordinating, guiding, and managing research and education in agriculture, horticulture, fisheries, and animal sciences across India[18].

Standing Finance Committee:
Oversees financial planning and resource allocation

Institute Management Committees:
Govern individual ICAR institutes

Research Advisory Committees:
Provide scientific guidance on research priorities

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3. Mandate and Mission

3.1 Core Mandate

ICAR's primary mandate encompasses four pillars[19]:

1. **Plan, Undertake, Coordinate and Promote Research and Technology Development for Sustainable Agriculture**
    - Conduct basic, strategic, and applied research
    - Develop climate-resilient and high-yielding crop varieties
    - Create sustainable crop production and protection technologies
    - Advance livestock, fisheries, and horticultural research
    - Promote natural resource conservation and management
2. **Aid, Impart and Coordinate Agricultural Education to Enable Quality Human Resource Development**
    - Establish and strengthen agricultural universities
    - Design curriculum and accreditation standards
    - Provide scholarships and fellowships
    - Conduct faculty training and capacity building
    - Promote excellence in agricultural education
3. **Frontline Extension for Technology Application, Adoption, Knowledge Management and Capacity Development**
    - Operate 731 Krishi Vigyan Kendras nationwide
    - Demonstrate proven technologies on farmers' fields
    - Conduct training for farmers and extension personnel
    - Facilitate farmer-scientist interaction
    - Develop farmer-friendly extension materials
4. **Policy, Cooperation and Consultancy in Agricultural Research, Education and Extension**
    - Provide scientific inputs for agricultural policies
    - Collaborate with national and international organizations
    - Offer consultancy services to government and private sector
    - Facilitate public-private partnerships
    - Support farmer producer organizations

3.2 ICAR Vision 2050

Vision Statement:

"Lead India to attaining sustainable food, nutritional, environmental and livelihoods security through agricultural research and education"[20][21]

Mission Statement:

"Harness the power of science and innovation for food security, food safety, farmer prosperity and enhance natural resources base to promote inclusive growth and sustainable development"[22][23]

Guiding Principles:

- **Farmer First:** Entire philosophy based on addressing changing needs of farmers
- **Scientific Excellence:** Promote intensive, problem-solving research
- **Economic Opportunities:** Create value for rural communities
- **Complementary Partnerships:** Collaborate for value addition and innovation acceleration
- **Proactive Response:** Address needs of farmers, consumers, partners, and policy makers
- **Ethical Conduct:** Maintain scientific integrity and accountability
- **Organizational Transformation:** Evolve into efficient, effective, responsive innovation system
- **Continuous Learning:** Foster educational environments for lifelong learning

Strategic Framework:

ICAR Vision 2050 provides a comprehensive roadmap addressing:

- Future agricultural production scenarios by 2050
- Food demand projections for growing population
- Climate change adaptation and mitigation strategies
- Sustainable intensification of agriculture
- Nutritional security beyond caloric sufficiency
- Integration of emerging technologies (biotechnology, nanotechnology, AI, IoT)

- Natural resource conservation and biodiversity preservation
- Farmer income enhancement and rural prosperity

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4. ICAR Institutional Network

4.1 Research Institutes

Total ICAR Research Institutes: 101 (comprising central institutes, national bureaux, project directorates, and national research centres) [24]

Categories of Research Institutions:

1. **Central Research Institutes (47):** Conduct comprehensive research on specific commodities or disciplines
   - Examples: ICAR-Indian Agricultural Research Institute (IARI), ICAR-Indian Veterinary Research Institute (IVRI), ICAR-Central Rice Research Institute (CRRI)
2. **National Bureaux (5):** Focus on genetic resources, biosafety, and specialized services
   - ICAR-National Bureau of Plant Genetic Resources (NBPGR)
   - ICAR-National Bureau of Animal Genetic Resources (NBAGR)
   - ICAR-National Bureau of Fish Genetic Resources (NBFGR)
   - ICAR-National Bureau of Agriculturally Important Insects (NBAII)
   - ICAR-National Bureau of Soil Survey and Land Use Planning (NBSS&LUP)
3. **Project Directorates (12):** Coordinate all-India coordinated research projects
   - Examples: Directorate of Weed Research (DWR), Directorate of Groundnut Research (DGR)
4. **National Research Centres (32):** Specialized research on specific crops, animals, or themes
   - Examples: National Research Centre on Seed Spices, National Research Centre on Equines
5. **Regional Stations and Sub-Stations:** Distributed across agro-climatic zones for location-specific research

Geographical Distribution:

ICAR institutes are strategically located across all states and union territories, ensuring representation of diverse agro-ecological zones, cropping systems, and farming communities.

4.2 Agricultural Universities

Total Agricultural Universities: 71 (State Agricultural Universities and Central Agricultural Universities)[25]

Categories:

- **State Agricultural Universities (SAUs):** Established by state governments with ICAR accreditation
  - Examples: Punjab Agricultural University (PAU), Tamil Nadu Agricultural University (TNAU), Banaras Hindu University Institute of Agricultural Sciences (BHU-IAS)
- **Central Agricultural Universities (CAUs):** Established by acts of Parliament
  - Central Agricultural University (Imphal), Rani Lakshmi Bai Central Agricultural University (Jhansi), Assam Agricultural University
- **Deemed-to-be-Universities under ICAR:** Research institutes granted university status
  - ICAR-Indian Agricultural Research Institute (IARI), ICAR-Indian Veterinary Research Institute (IVRI), ICAR-National Dairy Research Institute (NDRI)

Functions of Agricultural Universities:

- Offer undergraduate, postgraduate, and doctoral programs in agriculture and allied sciences
- Conduct location-specific adaptive research
- Operate constituent colleges across districts
- Manage agricultural research stations
- Provide extension education through KVKs and training centers
- Collaborate with ICAR institutes for research and human resource development

4.3 Krishi Vigyan Kendras (KVKs)

Total KVKs: 731 (as of 2026)[26][27]

Objective: District-level frontline extension centers for technology assessment, refinement, demonstration, and capacity building

Host Institution-Wise Distribution:

Host Organization	Number of KVKs
State Agricultural Universities	487
Central Agricultural Universities	22
ICAR Institutes	66
Non-Government Organizations	101
State Governments	38
Central Universities	3
Deemed Universities	7
Other Educational Institutions	5
Public Sector Undertakings	2
Total	**731**

Table 2: Distribution of Krishi Vigyan Kendras by Host Institution

KVK Functions:

- On-farm testing of crop varieties and technologies
- Frontline demonstrations on farmers' fields
- Training for farmers, farm women, and rural youth
- Capacity building for extension personnel
- Production and distribution of quality seeds and planting materials
- Soil and water testing services
- Diagnostic visits and crop health clinics
- Kisan Mobile Advisory Services

Historical Growth:

- 1974: First KVK established in Pondicherry
- Fifth Plan: 18 KVKs established

- 2005: Prime Minister announced one KVK per rural district goal
- 2007: 551 KVKs operational (Tenth Plan)
- 2026: 731 KVKs covering all agricultural districts[28]

4.4 Agricultural Technology Application Research Institutes (ATARIs)

Total ATARIs: 11 zones covering entire country[29]

Purpose: Monitor, review, and coordinate the KVK system at zonal level

Zone Distribution:

1. ATARI Zone I - Ludhiana (Punjab, Himachal Pradesh, Jammu & Kashmir)
2. ATARI Zone II - Jodhpur (Rajasthan, Gujarat)
3. ATARI Zone III - Kanpur (Uttar Pradesh, Uttarakhand)
4. ATARI Zone IV - Patna (Bihar, Jharkhand)
5. ATARI Zone V - Kolkata (West Bengal, Odisha, Andaman & Nicobar Islands)
6. ATARI Zone VI - Guwahati (North-Eastern States)
7. ATARI Zone VII - Jabalpur (Madhya Pradesh, Chhattisgarh)
8. ATARI Zone VIII - Pune (Maharashtra, Goa)
9. ATARI Zone IX - Jagtial (Telangana, Andhra Pradesh)
10. ATARI Zone X - Bengaluru (Karnataka)
11. ATARI Zone XI - Hyderabad (Tamil Nadu, Kerala, Puducherry, Lakshadweep)

4.5 Agricultural Technology Information Centres (ATICs)

Total ATICs: 44 (28 in Agricultural Universities, 16 in ICAR Institutes) [30]

Purpose: Single-window facility to provide information on agricultural technologies, facilitate technology transfer, and connect farmers with experts

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5. Thematic Research Divisions

5.1 Division of Crop Science

Location: Krishi Bhavan, New Delhi[31]

Deputy Director General: Dr. DK Yadav

- Phone: +91-11-23382545
- Email: ddgcs.icar@nic.in

Vision:

"Generating science-based knowledge to develop innovative technologies and varieties/products for ensuring sustainable food, nutritional and livelihood security"[32]

Technical Sections (6):

1. Food and Fodder Crops
2. Oilseeds and Pulses
3. Commercial Crops
4. Plant Protection
5. Plant Genetic Resources
6. Seed Science

Thrust Areas:

- Development of high-yielding, climate-resilient crop varieties and hybrids
- Harnessing conventional and modern tools (genomics, transgenics, gene editing)
- Efficient, economic, eco-friendly crop production technologies
- Integrated pest and disease management
- Conservation and sustainable use of plant genetic resources
- Refinement of seed production technologies and breeder seed production
- Bio-ecology and management of vertebrate pests (rodents, birds)
- Promotion of basic, strategic, and anticipatory crop science research

Major Institutes Under Crop Science:

- ICAR-Indian Agricultural Research Institute (IARI), New Delhi
- ICAR-Central Rice Research Institute (CRRI), Cuttack
- ICAR-Indian Institute of Wheat and Barley Research (IIWBR), Karnal
- ICAR-Indian Institute of Maize Research (IIMR), Ludhiana
- ICAR-Indian Institute of Pulses Research (IIPR), Kanpur
- ICAR-National Bureau of Plant Genetic Resources (NBPGR), New Delhi
- ICAR-Directorate of Weed Research (DWR), Jabalpur

Recent Achievements (2023-24):

Development of integrated weed management technologies for millets, seed spices, direct-seeded rice, wheat, and conservation agriculture systems; biocontrol of parasitic weed Striga in sugarcane; mechanical weeders and herbicide spraying systems; nozzle evaluation for herbicide efficacy[33].

5.2 Division of Horticultural Science

Location: Krishi Anusandhan Bhawan-II, New Delhi[34]

Deputy Director General: Dr. Sanjay Kumar Singh

- Phone: +91-11-25842068
- Email: ddghort@icar.org.in

Scope:

Horticultural Science Division spearheads horticultural research in India through 12 Central Institutes, 5 Directorates, 6 National Research Centres, 11 All India Coordinated Research Projects (AICRPs), and 1 Network Project[35].

Research Areas:

- Fruit crops (tropical, subtropical, temperate)
- Vegetable crops
- Ornamental plants and floriculture
- Plantation crops (coconut, arecanut, cashew, cocoa)
- Spices and medicinal plants
- Post-harvest technology and value addition

- Protected cultivation and precision horticulture
- Organic horticulture

Major Institutes:

- ICAR-Indian Institute of Horticultural Research (IIHR), Bengaluru
- ICAR-Central Potato Research Institute (CPRI), Shimla
- ICAR-Central Institute for Subtropical Horticulture (CISH), Lucknow
- ICAR-Indian Institute of Vegetable Research (IIVR), Varanasi
- ICAR-National Research Centre on Banana, Tiruchirappalli
- ICAR-Central Plantation Crops Research Institute (CPCRI), Kasaragod

5.3 Division of Animal Science

Location: Krishi Bhavan, New Delhi[36]

Deputy Director General: Dr. Raghavendra Bhatta

- Phone: +91-11-23381119
- Email: ddgas.icar@nic.in

Mandate:

Coordinate and monitor research activities in 19 Research Institutes and their Regional Centers/Stations covering animal breeding, genetics, nutrition, physiology, production, health, and veterinary sciences[37].

Research Domains:

- Cattle, buffalo, sheep, goat, pig, poultry, and equine improvement
- Animal genetics and genomics
- Animal nutrition and feed technology
- Animal reproduction and physiology
- Veterinary medicine and public health
- Animal disease diagnosis and control
- Fodder and grassland development
- Livestock product technology (meat, milk, eggs)

Major Institutes:

- ICAR-Indian Veterinary Research Institute (IVRI), Bareilly
- ICAR-National Dairy Research Institute (NDRI), Karnal
- ICAR-Central Sheep and Wool Research Institute (CSWRI), Avikanagar
- ICAR-National Research Centre on Pig (NRCP), Guwahati
- ICAR-Central Institute for Research on Goats (CIRG), Makhdoom
- ICAR-Indian Institute of Natural Resins and Gums (IINRG), Ranchi

Recent Achievements:

Development of 'Indichick' SNP chip for native chicken breed identification (97% specificity) and genomic selection for performance traits improvement in collaboration with ILRI (2023)[38].

5.4 Division of Fisheries Science

Location: Krishi Anusandhan Bhawan-II, New Delhi[39]

Deputy Director General: Dr. Joykrushna Jena

- Phone: +91-11-25846738
- Email: ddgfs.icar@gov.in

Coverage:

Research on marine fisheries, inland fisheries, aquaculture, fish genetics, fish processing, and post-harvest technology.

Research Areas:

- Fish breeding and genetics
- Aquaculture systems and technologies
- Marine capture fisheries
- Inland capture fisheries
- Fish nutrition and feed technology
- Fish health management
- Ornamental fish culture
- Fish processing and value addition

Major Institutes:

- ICAR-Central Marine Fisheries Research Institute (CMFRI), Kochi
- ICAR-Central Inland Fisheries Research Institute (CIFRI), Barrackpore
- ICAR-Central Institute of Freshwater Aquaculture (CIFA), Bhubaneswar
- ICAR-Central Institute of Brackishwater Aquaculture (CIBA), Chennai
- ICAR-National Bureau of Fish Genetic Resources (NBFGR), Lucknow

5.5 Division of Natural Resource Management

Location: Krishi Anusandhan Bhawan-II, New Delhi[40]

Deputy Director General: Dr. AK Nayak

- Phone: +91-11-25848364
- Email: ddgnrm.icar@gmail.com

Focus Areas:

- Soil health and fertility management
- Water resource management and irrigation
- Land use planning and watershed management
- Agroforestry and sustainable land management
- Climate change adaptation and mitigation
- Biodiversity conservation
- Precision agriculture and remote sensing
- Organic farming

Major Institutes:

- ICAR-Indian Institute of Soil Science (IISS), Bhopal
- ICAR-Indian Institute of Water Management (IIWM), Bhubaneswar
- ICAR-National Bureau of Soil Survey and Land Use Planning (NBSS&LUP), Nagpur
- ICAR-Indian Council of Forestry Research and Education (ICFRE), Dehradun

- ICAR-Central Agroforestry Research Institute (CAFRI), Jhansi

5.6 Division of Agricultural Engineering

Location: Krishi Anusandhan Bhawan-II, New Delhi[41]

Deputy Director General: Dr. SN Jha

- Phone: +91-11-25843415
- Email: ddgengg@icar.org.in

Research Domains:

- Farm mechanization and power
- Post-harvest technology and processing
- Renewable energy in agriculture
- Agricultural structures and environmental control
- Precision agriculture technologies
- Agro-processing and value addition
- Waste management and biomass utilization

Major Institutes:

- ICAR-Central Institute of Agricultural Engineering (CIAE), Bhopal
- ICAR-Central Institute of Post-Harvest Engineering and Technology (CIPHET), Ludhiana
- ICAR-Indian Institute of Crop Processing Technology (IICPT), Thanjavur

5.7 Division of Agricultural Extension

Location: Krishi Anusandhan Bhawan, New Delhi[42]

Deputy Director General: Dr. Rajbir Singh

- Phone: +91-11-25843277
- Email: ddg-extn.icar@gov.in

Mandate:

Manage and coordinate 731 Krishi Vigyan Kendras and 11 ATARIs for frontline extension, technology assessment, capacity building, and farmer advisory services[43].

Extension Mechanisms:

- Frontline demonstrations
- On-farm trials
- Training programs for farmers and extension workers
- Kisan Mobile Advisory Services
- Farmer scientist interaction
- Agricultural information centers
- Mass media campaigns
- Digital extension platforms

5.8 Division of Agricultural Education

Location: Krishi Anusandhan Bhawan-II, New Delhi[44]

Deputy Director General: Dr. Joykrushna Jena (Additional Charge)

- Phone: +91-11-25841760
- Email: ddgedn@gmail.com

Responsibilities:

- Coordination of agricultural education across 71 agricultural universities
- Curriculum design and accreditation
- Scholarship and fellowship programs
- Faculty recruitment and training
- Student admission coordination (ICAR-AIEEA)
- Quality assurance and accreditation
- International collaborations for education

Educational Programs:

- Bachelor of Science (BSc) in Agriculture, Horticulture, Forestry, Community Science
- Master of Science (MSc) and Master of Veterinary Science (MVSc)
- Doctor of Philosophy (PhD) programs
- Diploma programs
- Certificate courses

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6. Major Contributions to Indian Agriculture

6.1 Green Revolution and Food Security

Transformation from Food Deficit to Food Surplus:

ICAR played a pivotal role in India's Green Revolution (1960s-1980s) through:

- Development and introduction of high-yielding varieties (HYVs) of wheat and rice
- Popularization of semi-dwarf wheat varieties (Sonalika, Kalyan Sona)
- Promotion of IR-8 and other high-yielding rice varieties
- Package of practices for intensive cultivation
- Expansion of irrigation infrastructure

Impact:

- Wheat production increased from 11 million tonnes (1960s) to over 100 million tonnes
- Rice production increased from 35 million tonnes to over 120 million tonnes
- India achieved self-sufficiency in food grains
- Transformed from food importer to food exporter

6.2 White Revolution and Dairy Development

Operation Flood Success:

ICAR's research contributions through ICAR-NDRI and other institutes supported:

- Development of crossbred cattle varieties
- Buffalo improvement programs
- Animal health and nutrition technologies
- Milk processing and preservation techniques

Achievement:

India became the world's largest milk producer, with production exceeding 220 million tonnes annually.

6.3 Crop Variety Development

Thousands of Improved Varieties Released:

ICAR institutes and agricultural universities have developed and released over 5,000 improved crop varieties across cereals, pulses, oilseeds, horticulture, and commercial crops.

Recent Breakthroughs:

- Climate-resilient varieties (drought-tolerant, flood-tolerant, saline-tolerant)
- Biofortified varieties (high protein, high iron, high zinc, vitamin A-enriched)
- Disease and pest-resistant varieties
- Early-maturing and short-duration varieties for cropping system intensification

6.4 Integrated Pest Management

Reduction in Chemical Pesticide Use:

ICAR developed IPM modules for major crops, integrating:

- Biological control agents
- Cultural practices
- Host plant resistance
- Targeted pesticide application

Impact:

Reduced pesticide residues in food, environmental protection, and cost savings for farmers.

6.5 Natural Resource Management

Soil Health Card Scheme Support:

ICAR provided scientific foundation for soil health assessment and fertilizer recommendations.

Water-Use Efficiency:

Development of micro-irrigation technologies, drip and sprinkler systems, precision water management.

Agroforestry Models:

Integration of trees with crops and livestock for sustainable land use and additional income.

6.6 Technology Transfer Through KVKs

Massive Extension Reach:

731 KVKs conduct annually:

- Over 100,000 frontline demonstrations
- Training for more than 2 million farmers and rural youth
- Soil testing for millions of samples
- Distribution of quality seeds and planting materials

6.7 Human Resource Development

Building Agricultural Scientists and Professionals:

- Over 50,000 undergraduate students enrolled annually in agricultural universities
- Thousands of MSc and PhD degrees awarded each year
- Faculty training and capacity building programs
- International exposure and collaborations

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7. Contemporary Research Priorities

7.1 Climate-Resilient Agriculture

Focus Areas:

- Development of climate-smart crop varieties and animal breeds
- Weather-based agro-advisory services
- Climate forecasting and early warning systems
- Carbon sequestration and greenhouse gas mitigation
- Adaptation strategies for extreme weather events

7.2 Nutritional Security

Biofortification:

Development of nutrient-rich crop varieties:

- Iron and zinc-enriched rice, wheat, pearl millet
- Protein-rich pulses and oilseeds
- Vitamin A-enriched maize and sweet potato
- Anthocyanin-rich pigmented rice

Diversification:

Promotion of millets, pulses, horticulture, livestock, and fisheries for balanced nutrition.

7.3 Sustainable Intensification

Increasing Productivity While Conserving Resources:

- Conservation agriculture practices (zero tillage, residue management)
- Precision agriculture using sensors, drones, and AI
- Integrated farming systems (crop-livestock-fish-horticulture integration)
- Organic farming and natural farming promotion

7.4 Digital Agriculture and Innovation

ICAR Initiatives:

- KRISHI Portal for agricultural research data
- Remote sensing and GIS for crop monitoring
- Mobile apps for farmer advisories
- Artificial intelligence for pest and disease diagnosis
- Blockchain for supply chain transparency
- IoT-based farm management systems

7.5 Biotechnology and Genomics

Cutting-Edge Research:

- Genome sequencing of major crops and livestock
- Marker-assisted selection in breeding programs
- Genomic selection for accelerated genetic gain
- CRISPR-Cas gene editing (regulatory approvals pending)
- Bioinformatics and computational biology

7.6 Value Addition and Farmer Income Enhancement

Processing and Product Development:

- Post-harvest technologies to reduce losses
- Value-added products from agricultural commodities
- Dairy, meat, and fish processing technologies
- Nutraceuticals and functional foods
- Agri-business and entrepreneurship development

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8. International Collaborations

8.1 CGIAR Partnership

ICAR collaborates with CGIAR (Consultative Group on International Agricultural Research) centers including:

- International Rice Research Institute (IRRI)
- International Maize and Wheat Improvement Center (CIMMYT)
- International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)
- International Livestock Research Institute (ILRI)
- WorldFish Center

Recent Collaboration (2023):

ICAR-ILRI launched 'Indichick' medium-density SNP chip for native chicken breed identification and genomic selection under backyard poultry genomics project[45].

8.2 Bilateral Collaborations

Memoranda of Understanding (MoUs) with:

- Agricultural research organizations of USA, UK, Australia, Germany, France, Israel, Japan, China
- ASEAN countries for agricultural cooperation
- African countries for capacity building and technology transfer

8.3 International Training Programs

ICAR conducts training for agricultural scientists, extension workers, and students from developing countries in Asia, Africa, and Latin America.

8.4 Global Agricultural Research Partnerships

Active participation in:

- FAO (Food and Agriculture Organization) programs
- GCARD (Global Conference on Agricultural Research for Development)
- South-South cooperation initiatives
- International plant and animal genetic resources networks

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9. Challenges and Future Directions

9.1 Contemporary Challenges

India's Agricultural Sector Faces:

- Climate change impacts (erratic rainfall, temperature rise, extreme weather)
- Natural resource degradation (soil health decline, water scarcity)
- Declining farm sizes and fragmented landholdings
- Pest and disease pressures (new invasive species, resistance)
- Market volatility and price fluctuations
- Youth migration from agriculture
- Need for income enhancement beyond productivity increase

9.2 ICAR's Strategic Response

Vision 2050 Priorities:

1. **Nutrition-Led Agriculture:**
   - Shift from food security to nutritional security
   - Biofortification and functional foods
   - Diet diversification strategies
2. **Climate-Smart Technologies:**
   - Resilient varieties and breeds
   - Water-use efficient technologies
   - Carbon-neutral farming practices
3. **Precision Agriculture:**
   - IoT, sensors, drones for site-specific management
   - AI and machine learning for decision support
   - Robotics for farm operations
4. **Sustainable Intensification:**
   - Higher productivity per unit input
   - Conservation agriculture adoption
   - Integrated farming systems
5. **Value Chains and Markets:**
   - Post-harvest management
   - Processing and value addition
   - Farmer producer organizations strengthening
   - Digital market linkages
6. **Institutional Innovations:**
   - Public-private partnerships
   - Farmer-centric research approaches
   - Open science and data sharing
   - Intellectual property management

9.3 Emerging Research Areas

ICAR's Future Focus:

- Artificial intelligence and machine learning applications
- Nanotechnology for agriculture
- Gene editing and synthetic biology
- Microbiome research for soil and plant health
- Alternative proteins and cellular agriculture

- Space technology for agriculture (satellite data, remote sensing)
- Circular economy and zero-waste agriculture
- One Health approach (human-animal-environment nexus)

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10. COVID-19 Pandemic Response

10.1 Farmer Support During Lockdowns

ICAR Actions During COVID-19 (2020-2021):

- Issued national-level agro-advisory with safety measures for farmers
- Prepared state-wise agroadvisories for all 29 states based on prevailing crop stages
- Translated advisories into 15 regional languages for wider reach
- Provided guidelines for harvesting, post-harvest processing, storage, and marketing
- Emphasized social distancing during farm operations
- Received extensive coverage in print, electronic, and social media[46]

10.2 KVK Interventions

Krishi Vigyan Kendras Ensured:

- Continuity of extension services through digital platforms
- Supply of seeds and planting materials during lockdowns
- Mobile advisory services intensification
- Farmer helplines for addressing queries
- Virtual training programs
- Support for local marketing and home deliveries

10.3 Research Continuity

ICAR Institutes Maintained:

- Essential research activities with safety protocols
- Livestock care and fishery operations
- Crop experimentation and trials
- Digital scientific meetings and collaborations

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11. Contact Information

11.1 ICAR Headquarters

Primary Address:

Indian Council of Agricultural Research (ICAR)
Krishi Bhavan
New Delhi - 110001
India

Phone: +91-11-23388991-9 (Director General)
+91-11-23382375 (Chief Vigilance Officer)
+91-11-25843301 (Public Relations Officer)

Websites:

- Official Portal: https://icar.org.in
- India Science and Technology Portal: https://www.indiascienceandtechnology.gov.in/organisations/ministry-and-departments/indian-council-agricultural-research-icar

Email: dg.icar@nic.in

11.2 Additional Administrative Offices

Krishi Anusandhan Bhawan-I:
Pusa Campus, New Delhi - 110012

Krishi Anusandhan Bhawan-II:
Pusa Campus, New Delhi - 110012

11.3 Divisional Contacts

Division	Email
Crop Science	ddgcs.icar@nic.in
Horticultural Science	ddghort@icar.org.in
Animal Science	ddgas.icar@nic.in
Fisheries Science	ddgfs.icar@gov.in
Natural Resource Management	ddgnrm.icar@gmail.com
Agricultural Engineering	ddgengg@icar.org.in
Agricultural Extension	ddg-extn.icar@gov.in
Agricultural Education	ddgedn@gmail.com

Table 3: Email Contacts for ICAR Divisions

11.4 Knowledge Management

Directorate of Knowledge Management in Agriculture (DKMA):

Dr. Anuradha Agrawal, Project Director
5th Floor, Krishi Anusandhan Bhawan-I
Pusa, New Delhi - 110012

Phone: +91-11-25842787
Email: pddkma@icar.org.in

11.5 Route to Headquarters

Route map to Krishi Bhavan available on ICAR website contact section.

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12. Online Presence and Digital Resources

12.1 Official Websites

Main Portal: https://icar.org.in

- Organizational information
- Research programs and achievements
- Training and education details
- Publications and reports
- Tenders and recruitments

- Farmer resources

India Science and Technology Portal: https://www.indiascienceandtechnology.gov.in/organisations/ministry-and-departments/indian-council-agricultural-research-icar

- Organizational profile
- Research focus areas
- COVID-19 response activities

12.2 Social Media Presence

- **Facebook:** Official ICAR page for updates and farmer engagement
- **X (Twitter):** @icarindia for real-time information
- **YouTube:** ICAR channel for training videos and webinars
- **Instagram:** Visual content on agricultural innovations

12.3 Digital Platforms and Portals

KRISHI Portal: https://krishi.icar.gov.in

- Agricultural research data repositories
- Publications and research papers
- Experimental and survey data
- Geo-spatial information

ICAR-ERP: Enterprise resource planning system for financial, HR, and project management across ICAR

e-Office: Digital file management system

SPARROW: Research publication repository

Mobile Apps: Farmer advisory apps, pest identification apps, weather-based advisory apps

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13. Conclusion

The Indian Council of Agricultural Research (ICAR) stands as India's foremost agricultural research organization and one of the world's largest national agricultural research systems, with an illustrious history spanning over nine decades since its establishment in 1929[47]. From the Green Revolution's high-yielding varieties to contemporary climate-resilient technologies, ICAR has been the scientific backbone of India's agricultural transformation, enabling the nation to achieve food self-sufficiency and emerge as a global agricultural powerhouse.

Key Achievements:

1. **Institutional Excellence:** World's largest agricultural research network with 101 institutes, 71 universities, and 731 KVKs serving every agricultural district
2. **Food Security:** Enabled India's transformation from food-deficit to food-surplus nation through high-yielding varieties and sustainable technologies
3. **Human Resource Development:** Trained millions of agricultural scientists, extension workers, and farmers, building capacity across the agricultural sector
4. **Technology Innovation:** Developed thousands of improved crop varieties, livestock breeds, production technologies, and management practices
5. **Extension Impact:** Massive technology dissemination through KVKs reaching millions of farmers annually with demonstrations, training, and advisories
6. **Policy Influence:** Provided scientific foundation for national agricultural policies, schemes, and strategic planning
7. **International Leadership:** Collaborated with global agricultural research institutions, trained scientists from developing countries, and contributed to international food security

Vision for the Future:

As outlined in ICAR Vision 2050, the Council is positioning Indian agriculture for the challenges ahead[48]:

- **From Food to Nutrition:** Shifting focus from caloric sufficiency to nutritional security through biofortification and diet diversification
- **Climate Resilience:** Developing technologies for adaptation and mitigation in the face of climate change
- **Sustainability:** Promoting conservation agriculture, natural resource management, and circular economy principles
- **Digital Transformation:** Harnessing AI, IoT, remote sensing, and precision agriculture for evidence-based farming
- **Farmer Prosperity:** Beyond productivity enhancement, focusing on value addition, market linkages, and income growth
- **Inclusive Growth:** Ensuring benefits reach smallholder farmers, women farmers, tribal communities, and marginalized regions

Call to Action:

- **Farmers:** Engage with nearest KVK for accessing latest technologies, training, and advisory services
- **Students and Researchers:** Pursue agricultural education and research careers through ICAR's extensive network of universities and institutes
- **Entrepreneurs and Industry:** Collaborate with ICAR for technology commercialization, product development, and value chain enhancement
- **Policy Makers:** Leverage ICAR's scientific expertise for evidence-based policy formulation and program design
- **International Partners:** Engage in collaborative research, capacity building, and knowledge exchange for global agricultural advancement

ICAR's journey reflects India's commitment to agricultural science, innovation, and farmer welfare. As the nation aspires to achieve the Sustainable Development Goals and ensure food and nutritional security for its 1.4+ billion population, ICAR's role as the innovation engine of Indian agriculture remains more critical than ever. Through

its guiding principle of "Farmer First," research excellence, institutional network, and strategic vision, ICAR continues to lead India toward sustainable, resilient, and prosperous agriculture.

"Harnessing Science for Farmer Prosperity and National Food Security"

"Leading Agricultural Innovation for Sustainable and Inclusive Growth"

Jai Vigyan, Jai Kisan! (Hail Science, Hail Farmer!)

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Document Version: 1.0

Last Updated: March 1, 2026

Compiled by: AI Agricultural Advisory System for Farmers in India

Data Sources: India Science and Technology Portal, ICAR Official Website (icar.org.in), ICAR Vision 2050 Document, Press Information Bureau (PIB), ILRI News, Agricultural University Websites, KVK Network Information, ICAR Annual Reports, Wikipedia, Educational Resources (BYJU'S, Vedantu, Tarun IAS)

Usage: This comprehensive guide is prepared for educational and informational purposes to assist farmers, agricultural students, researchers, policy makers, and stakeholders in understanding ICAR's organizational structure, research contributions, institutional network, and services for advancing agricultural science and farmer welfare in India.

Acknowledgment: This document recognizes the pioneering contributions of ICAR scientists, educators, extension workers, and

administrators who have continuously advanced Indian agriculture through research innovation, human resource development, and technology dissemination since 1929, supporting India's journey from food deficit to food security and toward nutritional security and farmer prosperity.

Leading Agricultural Research for Sustainable Growth and Farmer Welfare

Empowering Indian Agriculture Through Science and Innovation