

# PARLIAMENT QUESTION: RURAL TECHNOLOGY DEMONSTRATION PROJECTS

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The Government, through Department of Science and Technology (DST) and Council of Scientific and Industrial Research (CSIR), have been actively promoting technology transfer, rural innovation and scientific solutions to address livelihood challenges in agriculture-dependent regions across the country.

## I. Department of Science and Technology (DST) and Department of Biotechnology (DBT)

Through its competitive diverse schemes and programmes, efforts are being made by DST to empower the communities by adopting technologies to address locally defined needs and priorities through improved resource-use efficiency, sustainable management of environmental resources, reduction of waste and pollution, and development of locally adaptable solutions contributing to sustainable agricultural practices and rural livelihoods. The projects supported by DST are strengthening human capacities, institutional capacities and technology deployment. The details of some of the initiatives from DST and DBT are given in Annexure I.

## II. Council of Scientific and Industrial Research (CSIR)

CSIR laboratories drive rural innovation and technology transfer through diverse missions. The details of these missions are given in Annexure II.

During the past three years, the Government has implemented several technology demonstration projects across different regions of the country, including the Khajuraho Lok Sabha region.

**DST** has established SC/ST Cell at the Madhya Pradesh Council of Science & Technology in March 2026. The Cell will serve as a dedicated mechanism for:

- Mapping livelihood systems to support development planning.
- Identifying technological gaps and assessing community-specific needs.
- Formulating research and demonstration projects tailored to local contexts.
- Designing targeted programmes for socio-economic upliftment by leveraging local resources and indigenous skills.

The Cell's activities will extend to 20 districts in Madhya Pradesh, with special focus on SC-dominated areas such as Chhatarpur, thereby ensuring inclusive and sustainable development outcomes.

**CSIR** has already supported the following activities in the region:

1. Around 1,000 farmers in seven Bundelkhand districts adopted aromatic crop cultivation. In Panna district: 58.5 acres of area was covered and one Field Distillation Unit was installed at Rehuta. In Chhatarpur district: 189 acres of area was covered and 02 Field Distillation Units were installed at Thakurra and Nandlalpura.

2. Training programmes on incense stick (agarbatti) making were conducted in Chhatarpur for women empowerment.
3. Under CSIR Aroma Mission, total 689 farmers benefited through the organized training programmes. More than 65 hectares area was covered by lemongrass cultivation in Anuppur, Shahdol, Katni, and Dindori districts of Madhya Pradesh.

In total, CSIR-Central Institute of Medicinal and Aromatic Plants (CSIR-CIMAP) organized 13 Kisan Melas, in which more than 33,700 farmers, entrepreneurs and industry representatives participated. During the last five years, 150 skill-cum-technology up-gradation programmes were organized in different States of the country, in which around 7,863 farmers/entrepreneurs and women participated, and 192 one-day awareness programmes were also organized, in which about 10,000 farmers participated from different States of the country.

The Department of Science & Technology (DST) and the Council of Scientific & Industrial Research (CSIR) implement science and technology-based development programmes on a PAN-India basis. The Government is committed to expand technology-driven livelihood opportunities and provide scientific support for agriculture and rural enterprises across the country, including the Khajuraho Lok Sabha region.

DST supports competitive, merit-based research and innovation projects through its various schemes nationwide, with equal access for institutions and researchers in Khajuraho. Calls for proposals under these schemes are published on the DST website and the EPMS portal. Eligible institutions and researchers from the region may apply and avail support, subject to scheme provisions and selection through the prescribed merit-based evaluation process. (Link for DST schemes-<https://dst.gov.in/schemes-programmes>).

#### Annexure I

#### **(I) Department of Science and Technology (DST)**

1. The Science Technology Innovation (STI) Hub programme of DST has enhanced the livelihood opportunities for SC and ST communities across the country with Science and Technology interventions. The initiative focuses on strengthening the social welfare system through the adoption of cutting-edge scientific technologies and modern techniques.
2. The Women Technology Parks (WTP) programme of DST has improved the weakest link of the predominant livelihood system of women in specific areas and promoted social entrepreneurship and women employment based on the strongest link of the livelihood system through interventions of Science, Technology and Innovations.
3. The Strengthening, Upscaling & Nurturing Innovations for Livelihood (SUNIL) programme of DST, supports NGOs and Knowledge Institutions (KIs) in partnership for identifying livelihood centric local/systemic problems and focuses on development of innovative technologies and appropriate S&T based solutions through applied research; developing models of technology delivery & social enterprise creation for socio-economic development of Economically Weaker Section (EWS), and capacity building of Community based Organizations (CBOs) & NGOs through KIs and vice versa.
4. The National Mission on Interdisciplinary Cyber Physical Systems (NM-ICPS) of DST, has supported Technology Innovation Hub at IIT Ropar focused on advancing research and innovation in "Technologies for Agriculture & Water". The initiatives include technologies for precision agriculture, smart irrigation, Artificial Intelligence (AI)-

based crop advisory, livestock management, weather intelligence, soil and water assessment and crop-residue management. These include Automatic Rain Gauges, AI and Internet of Things (IoT)-enabled livestock health monitoring devices, biodiversity sensors, soil health monitoring systems and IoT-based water management solutions. The initiatives are implemented in collaboration with startups, industry, research institutions, State Government agencies, Farmer Producer Organisations (FPOs) and Krishi Vigyan Kendras (KVKs), with a focus on technology transfer, commercialisation, rural entrepreneurship and capacity building.

5. The Autonomous Institutions (AI's) under the Department of Science and Technology (DST) are actively developing/deploying scientific solutions, scaling grassroots innovations, and bridging the lab-to-field gap. The multi-pronged approach strengthens the livelihoods across India's agriculture-dependent regions. Various initiatives of different AI's are given below:-

**Agharkar Research Institute (ARI), Pune** promote rural innovation and technology transfer by developing climate-resilient crop varieties, decentralized bioenergy solutions, and disease-detection kits that directly combat agricultural livelihood challenges.

#### **Climate-Resilient Crop Development**

- Biofortified Wheat: Developed high-yielding, rust-resistant, and nutrient-dense varieties like MACS 4028 (rich in protein, iron, and zinc) and MACS 6222 / MACS 6478 to elevate farm income and food security.
- Pest-Resistant Soybean: Developed MACS 1407, a high-yielding soybean variety suited for rain-fed conditions across central, eastern, and northeastern states, featuring resistance to major pests and adaptability to mechanical harvesting.
- On-Field Demonstrations: Partnered with state seed corporations (like MAHABEEJ) for large-scale field trials and technical training on agronomic practices.

#### **Bioenergy and Rural Waste Solutions**

- Alternatives to Stubble Burning: A cost-effective anaerobic fungi mixture from farm waste, primarily rice straw, has been developed to rapidly break down crop residue into nutrient-rich manure within a fortnight, offering a sustainable alternative to stubble burning
- Alternative Dwarf Wheat Genes: ARI mapped wheat genes (Rht14 and Rht18) that allow successful seedling emergence and deeper sowing even when rice stubble is retained directly in the field
- Pilot-Scale Clean Energy: Commissioned pilot biohydrogen and biomethane facilities to establish scalable, waste-to-wealth rural economic models.

**Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bengaluru** has developed *Nanomatrix for Delivery of Semiochemicals*, specifically the *Development of Nanomatrix for Pheromone Release*, an ordered mesoporous silica nanomatrix used as a slow-release dispenser for red palm weevil pheromones. The technology helps farmers control red palm weevil infestation in coconut plantations through a special trap that provides longer pheromone release, requires less pheromone and reduces the frequency of replacement. The technology has been jointly developed by JNCASR and ICAR. The technology scaled down the reliance on chemical pesticides, promoting environmentally sustainable practices and deployed in more than 5000 acres in Karnataka, Kerala and Tamil Nadu.

**Institute of Advanced Study in Science and Technology (IASST), Guwahati** has structured a strict Technology Transfer Policy that manages intellectual property protection, patent filing, and licensing agreements through **Technology Transfer Cell (TTC) ensuring** laboratory

breakthroughs are seamlessly scaled up into market-ready, commercial entities. IASST Social Venture & Entrepreneurship Council (ISVEC) and its BioNEST incubator provide legal validation, business mentoring, and technical infrastructure for agritech and biotech startups and the institute collaborates with major corporate entities to monetize indigenous bio-resources. For instance, IASST through Village Adoption Programme, Integration of Indigenous Knowledge (ITKs) and Self-Help Group (SHG) support promote rural innovation. Significant scientific solutions for livelihood challenges developed by IASST are given below:

- Crop Protection & Management: Developed specialized agricultural innovations, including an Endophytic Actinomycetia-based bioformulation to arrest Fusarium dieback disease in commercial tea plantations.
- Alternative Farming Ecosystems: Deployed and trained rural farmers in high-yield mushroom cultivation, papaya cultivation, vermicomposting, and high-value black rice farming to diversify regular crop risks.
- Seri-Biotechnology Interventions: Introduced systematic, scientific methods for Eri-silk rearing, substantially lowering cocoon mortality rates and improving the raw material output for local weavers.
- Value-Added Agri-Foods: Transformed perishable traditional foods into stable commercial functional foods—such as anti-obesity fermented bamboo shoots, soy-yogurt with extended shelf lives, and safe starter cultures for processed fish (*Xidol*)

**National Innovation Foundation – India (NIF), Ahmedabad** actively works across various States to identify local challenges and deploy relevant grassroots innovations focused on livelihood enhancement, drudgery reduction and improving output and efficiency. NIF organises demonstrations and hands-on training programmes for beneficiaries in collaboration with local partners.

**North East Centre for Technology Application and Reach (NECTAR), Shillong** promotes technology transfer and rural innovation through technology-driven interventions in collaboration with leading national institutions. These include technology transfer for banana pseudostem value addition under the PM-DevINE (Prime Minister's Development Initiative for North Eastern Region) scheme, transfer of Banana Fibre-based Vegan Leather Technology from CSIR-NIIST (Council of Scientific & Industrial Research – National Institute for Interdisciplinary Science and Technology) and Banana Yarn Making Technology from ICAR-NINFET (Indian Council of Agricultural Research – National Institute of Natural Fibre Engineering and Technology). Efforts also encompass the establishment of a Technology Demonstration Centre, deployment of Mobile Processing Units for fruits and vegetables, and installation of solar dehydrators. Additionally, promotion of Farmer Producer Organisations (FPOs) and support for grassroots technologies such as low-cost pineapple peeling, manual broom binding, Hydraulic Ram Pumps, and Vasundhara Soil Organic Carbon Detection Technology are being prioritized for sustainable agriculture and rural livelihood enhancement.

**The Institute of Nano Science and Technology (INST) Mohali** developed nanotech solutions for agriculture, including nano-fertilisers and targeted nutrient delivery, smart agri-sensors, and safer food preservation wrappers. INST drives regional and national impact via collaborative R&D, industry joint projects, and educational rural outreach programs. Details of Scientific Solutions in Agriculture developed by INST are given below

- Targeted Nano-Nutrients: Engineered smart materials release essential plant nutrients in a controlled manner, reducing chemical waste and improving crop yields in farming regions.
- Agri-Sensing & Diagnostics: Nanoparticle-enabled optical and electrical sensors provide early detection of soil quality shifts and crop pathogens.

- Post-Harvest Protection: Developed advanced nano-based carbon wrappers and storage materials to extend the shelf life of perishable fruits and vegetables without toxic chemical preservatives.

## **(II) Department of Biotechnology (DBT)**

- Programmes such as Biotech-KISAN and Biotechnology-based Societal Development Programs have been implemented in 115 aspirational districts across the country.
- During the last three years, over 40 institutions including IITs, ICAR institutes, State Agricultural Universities, NGOs and KVKs have been engaged. Approximately 20,000–25,000 farmers have been benefited directly, along with 5,000 rural youth and local enterprises trained in entrepreneurship through Biotech Kisan and Rural hubs. More than 600 Self-Help Groups (SHGs) have been strengthened, creating 350+ rural enterprises in various areas of Biotechnology.

## Annexure II

### **I. AROMA MISSION:**

CSIR-Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow develops and transfers technologies for medicinal and aromatic crops cultivation, quality planting material, post-harvest processing, value addition, distillation technologies, skill development, market linkages and entrepreneurship to enhance farmers' income, promote climate-resilient agriculture and generate rural employment under various projects.

CSIR-CIMAP, Lucknow is also promoting medicinal and aromatic plants cultivation among farmers by organizing skill development, training, awareness programs and Kisan Melas, etc.

### **II. RSSA MISSION:**

CSIR has put its efforts in developing a suite of advanced technologies under its national mission on 'Region Specific Smart Agro-Technologies for Soil and Plant Health (RSSA)'. These technologies include digital soil intelligence systems, AI-powered disease diagnostics, variable-rate fertiliser application, IoT-based climate monitoring systems, UAV (Unmanned Aerial Vehicle)-enabled crop analytics, and soil nutrient sensing solutions specifically designed for Indian agricultural conditions.

### **III. SEAWEED MISSION:**

CSIR- Central Salt & Marine Chemicals Research Institute (CSMCRI)'s commercially licensed seaweed biostimulant technologies, including Kappaphycus- and Sargassum-based products, presently account for an estimated 18–20% of the Indian seaweed biostimulant market, representing a business value of approximately ₹360–400 crore. Field evaluations have further demonstrated substantial economic benefits to farmers, providing an incremental return up to ₹9,403 per hectare through improved crop productivity and input-use efficiency.

### **IV. Mission Mode Project on “Smart Village”**

CSIR implemented a Mission Mode Project on “Smart Village” in October 2025. The project aimed to transform rural India through advanced technology, improved infrastructure, and sustainable development practices. It creates model Smart Villages across diverse geographical regions—including Gujarat, Assam, Madhya Pradesh, Odisha, and Rajasthan—by deploying cutting-edge CSIR technologies and eco-friendly solutions that address the unique challenges faced by rural communities.

This information was given by the Minister of State (Ind. Charge) Science & Technology; Earth Sciences and Minister of State PMO; Personnel, Public Grievances and Pensions; Department of Atomic Energy and Space Dr. Jitendra Singh in a written reply in Lok Sabha today.

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