

**GOVERNMENT OF INDIA  
MINISTRY OF SCIENCE & TECHNOLOGY  
DEPARTMENT OF BIOTECHNOLOGY**

**LOK SABHA  
UNSTARRED QUESTION NO. 5517  
ANSWERED ON 25.03.2026**

**High-Tech Soil Scanning and Bio-Waste Innovation in Uttar Pradesh.**

**5517: Adv Priya Saroj:**

**Will the Minister of SCIENCE & TECHNOLOGY be pleased to state:**

**(a)** whether there is any proposal to establish an advanced or “Central Soil Scanning Centre” in major potato and sugarcane growing belts of Uttar Pradesh to provide high-resolution soil nutrient mapping and real-time advisory support to farmers and if so, the details thereof;

**(b)** the present status of deployment of portable soil-testing and GIS-based nutrient mapping technologies in the State under Central research programmes, State and district-wise, particularly for Uttar Pradesh;

**(c)** whether any pilot projects on bio-waste innovation, including conversion of sugarcane residue and potato waste into bio-fertilizers, bio-energy or value-added products are being supported in Uttar Pradesh and if so, the details thereof; and

**(d)** the steps taken to bridge the technology gap between agricultural research institutions and field-level implementation to promote precision farming and sustainable soil health management in the State?

**ANSWER**

**MINISTER OF STATE (INDEPENDENT CHARGE) FOR THE  
MINISTRY OF SCIENCE AND TECHNOLOGY & EARTH SCIENCES  
(DR. JITENDRA SINGH)**

**a) and b)** The Government, under the Soil Health & Fertility Scheme of Department of Agriculture, Farmers Welfare (Ministry of Agriculture and Farmers Welfare) has established 256 Static Soil Testing Labs and 06 Village Level Soil Testing Labs in the state of Uttar Pradesh.

Since, 2014-15 till date 4.07 Crore soil health card have been distributed/issued/generated in the state of Uttar Pradesh under the Scheme.

c) The Government through the Department of Biotechnology(DBT),Ministry of Science & Technology under the Bio-RIDE Scheme has supported laboratory to pilot projects on developing the enabling technologies for waste bio-innovations focused on bioremediation, and recycling across the country including Uttar Pradesh. The Department has also supported research, development and demonstration projects focused on mixed organic biomass as well as the agricultural residues including potato and sugarcane waste in integrated bio-refinery approach.

Supported projects on organic and biowaste to value added products viz. bio-fertilizers, bioenergy and value-added products, spanning across the pilots to bench scale in Uttar Pradesh are:

- Pilot scale biorefinery for value added wealth generation of biogas, lutein and biofertilizer from temple flower wastes with zero discharge;
- Treatment of organics-laden industrial waste water effluent under flow conditions using photobioreactor-integrated microbial fuel cell;
- Single-enzyme bioanode for electricity generation by oxidizing phenolics in enzymatic fuel cell;
- Lab scale biorefinery for concomitant production of biofuel(s) along with other important products using agricultural waste and optimization of post methanated distillery effluent (PMDE) TDS reduction for development of decolourisation and detoxification technique in two step treatment process using bacteria and constructed wetland plant treatment.

In addition to above, the Department of Biotechnology (DBT) through it's Public Sector Undertaking i.e. Biotechnology Industry Research Assistance Council (BIRAC) has also supported following projects on bio-waste management and sustainable biotechnology solutions in the state of Uttar Pradesh so far:

- Helpusgreen® Bio-leather Animal free leather made from floral-waste/ Temple Waste into Sustainable Products
- Protein-based bioplastics and biocomposites made from upcycled poultry waste from a processing perspective
- Mycelium Based Materials
- Development of process know how for butanol production from lignocellulosic biomass
- Production of Beta Galactosidase using Agriwaste
- Conversion of lactose and glucose based feedstocks to Butanol-feasibility study
- Studies on Bioconversion of glycerol a byproduct of biodiesel industry into a economically important 1, 3 propandiol, its purification and scaling up (Phase-II)
- Removal of Hydrogen Sulphide from Biogas by Recovering Sulphur from it
- Valorization of Agro waste for converting into bio active compounds/ bio-fuels/bio-chemicals using biotechnology process with microbial / enzymes in dark fermentation technology

Besides, the Indian Council of Agricultural Research (ICAR), Ministry of Agriculture and Farmers Welfare has developed the Pusa Decomposer technology, which facilitates efficient ex-situ decomposition of agricultural residues such as sugarcane trash and press mud into value-added products like enriched compost and Phosphate Rich Organic Manure (PROM), promoting circular agriculture and reducing residue burning.

Further, ICAR has also developed various composting techniques and enriched organic manures, and promotes organic and integrated farming systems, particularly in states such as Uttar Pradesh, to encourage effective waste utilization.

**d)** The Government through, Indian Council of Agricultural Research (Ministry of Agriculture and Farmers Welfare) has undertaken multiple steps to bridge the gap between agricultural research and field-level implementation, particularly in precision farming, sustainable soil health management, and biowaste conversion. A key initiative is the development and commercialization of the Pusa STFR meter (PUSA Soil Test and Fertiliser Recommendation Meter), a digital portable soil testing machine capable of analyzing 14 soil parameters, which has been scaled through manufacturing by 21 firms and widely distributed, including 1000 units to Kendriya and Navodaya Vidyalayas and around 500 units to fertilizer industries, NGOs, and Farmer Producer Organizations, thereby strengthening real-time soil diagnostics at the grassroots level.

Further, ICAR operationalizes technology dissemination through its nationwide network of Krishi Vigyan Kendras, which undertake field demonstrations, technology assessment, and farmer capacity-building programmes, ensuring the adoption of innovations in precision farming and sustainable soil management in various states of the country including Uttar Pradesh. These integrated efforts collectively strengthen the linkage between laboratory research and farm-level application, fostering sustainable and technology-driven agriculture.

In addition to above, the Government through Biotechnology Industry Research Assistance Council (BIRAC), a PSU under Department of Biotechnology (DBT), promotes industry-academia collaboration and supports technology validation and commercialization, enabling adoption of innovative solutions in areas such as sustainable agriculture, bio-based inputs, and resource-efficient technologies. These efforts contribute to promoting precision farming practices and improving soil health management through scalable and field-ready innovations.

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