

GOVERNMENT OF INDIA
MINISTRY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH
RAJYA SABHA
UNSTARRED QUESTION No. 3326
(ANSWERED ON 21.08.2025)

TECHNOLOGICAL INTERVENTION TO IMPROVE AGRICULTURE IN MAHARASHTRA

3326. Shri Dhananjay Bhimrao Mahadik:

Will the Minister of SCIENCE AND TECHNOLOGY be pleased to state:

- (a) the technological interventions introduced to enhance agricultural productivity in the State of Maharashtra;
- (b) the projects supporting precision farming and water conservation;
- (c) the collaboration with State agriculture departments; and
- (d) the extension services to educate farmers on new technologies?

ANSWER

MINISTER OF STATE (INDEPENDENT CHARGE) FOR THE
MINISTRY OF SCIENCE AND TECHNOLOGY AND EARTH SCIENCES

(DR. JITENDRA SINGH)

- (a) Council of Scientific and Industrial Research (CSIR), under its Aroma Mission, introduced aromatic crop cultivation viz. Lemongrass, Palmarosa, Tulsi (Basil), Geranium etc., which can easily be cultivated with minimum requirements of water and nutrients and grow well in adverse conditions. These crops can easily be cultivated in rainfed conditions, which provides a better option for farmers to adopt on their land and increase the soil health and income as compared to traditional crops. As a water conservation intervention, the selected crops like lemongrass, palmarosa and basil may conserve the water because these crops require low water inputs. Under the CSIR Aroma Mission, the technological intervention in Maharashtra is as follows:

Technological Impact of CSIR Aroma Mission (2022-2025) in Maharashtra			
Name of Aroma Cluster	Aromatic Crop	Area Covered (Acre)	Essential Oil Produced (Kg)
Dhule (Nandurbar)	Lemongrass Palmarosa Geranium	60	Lemongrass-2500 Palmarosa-80 Geranium-30
Kolhapur	Lemongrass	03	Lemongrass-300
Nashik	Geranium, Tulsi	05	Geranium-50
Satara	Lemongrass Geranium	05 1.5	Lemongrass-500 Geranium-125

CSIR-National Chemical Laboratory (CSIR-NCL), Pune has developed and transferred biopesticide solutions derived from microbial and phytochemical origins for sustainable pest management in Maharashtra. Large-scale development, field validation, and deployment of these biopesticide technologies across multiple agro-climatic zones in Maharashtra have also been undertaken in collaboration with Mahatma Phule Krishi Vidyapeeth (MPKV) and BAIF Development Research Foundation. These formulations aim to reduce chemical pesticide dependence while maintaining or enhancing crop productivity.

In addition to the above, constituent laboratories of CSIR, namely, CSIR-Central Food Technological Research Institute (CSIR-CFTRI), CSIR-National Botanical Research Institute (CSIR-NBRI), and CSIR-National Chemical Laboratory (CSIR-NCL), have transferred a few technologies to industries based in Maharashtra for value addition and productivity enhancement. The list of the same is at **Annexure-I**.

- (b) Brief details of significant projects undertaken by CSIR in the area of precision farming and water conservation are at **Annexure II**.
- (c)&(d) The brief details of the collaborative efforts of CSIR with the Maharashtra State agriculture departments, including extension services provided to educate farmers on new technologies, are as under:

CSIR-Central Institute of Medicinal and Aromatic Plants (CSIR-CIMAP), Lucknow

- CSIR-CIMAP has signed MoU with Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri district, Maharashtra for the cultivation and conservation of aromatic crops for the farmers. Under this MoU, a few awareness and training programmes were conducted at Sindhudurg and Ratnagiri districts of Maharashtra.
- Organised 10 entrepreneur development training programmes of five-day duration in collaboration with Agriculture Technology Management Agency (ATMA), Agriculture Department, Government of Maharashtra. Approximately 325 farmers, ATMA officers, and women were trained in cultivation, processing, and marketing of MAPs at CSIR-CIMAP, Lucknow. In these programmes, new technologies for sustainable agriculture such as making of vermi-compost, cutlery from waste, mushroom cultivation, making of rose water, incense sticks and fragrant cone were disseminated to the trainees.
- About 83 officers and staff of the Agriculture Technology Management Agency (ATMA), Agriculture Department, Government of Maharashtra, were trained by the institute.
- Collaborated with Janseva Foundation, Loni Ahmadnagar, Maharashtra for technological intervention towards utilization of offered flowers in Shri Sai Temple, Shirdi for making incense sticks and fragrant cones and provided employment to about a thousand women.

CSIR-Indian Institute of Integrative Medicine (CSIR-IIIM), Jammu

CSIR-IIIM, Jammu in collaboration with Krishi Vigyan Kendra (KVK), Jalna (Maharashtra), has organized a series of awareness cum training programs in different locations of Maharashtra. These programs were aimed at promoting the cultivation of high-value aromatic plants such as Rosagrass and Himrosa.

CSIR-National Chemical Laboratory (CSIR-NCL), Pune

- CSIR-NCL in collaboration with Mahatma Phule Krishi Vidyapeeth, Rahuri, has developed and released two chickpea varieties (Digvijay and Rajas) and jointly conducted field trials and farmers' participatory plant breeding.
- The laboratory helped the Maharashtra Agriculture Department to develop policies on DNA fingerprinting of crop varieties for registration and release.
- Conducted several farmer training programs in collaboration with Farmlab to enable on-site development and application of biopesticides and biostimulants. These programs are designed for minimal resource use and hands-on skill building, ensuring that farmers can independently prepare and apply the formulations at the field level for improved crop health and sustainability.

CSIR-Central Food Technological Research Institute (CSIR-CFTRI), Mysore

About 400 farmers of Maharashtra State have been trained in diverse areas such as Processing of Paddy and Pulses for value addition, Processing of Millets (Ragi, Rice, Millet, and Maize) and value addition, Post harvest technologies of fruits and vegetables, Processing of Spice (turmeric, chilly) and value added products, Pre and Post-Harvest Management of Oranges, Value addition on Cashew and Raisins processing and Rice Parboiling Milling Processing and value addition.

CSIR-National Environmental Engineering Research Institute (CSIR-NEERI), Nagpur

CSIR-NEERI conducted a workshop for farmers from Nagpur and nearby areas, wherein the Engineered Constructed Wetland System (ECWS) was demonstrated to promote its wider adoption in rural areas as part of extension services to educate farmers on new technologies.

Technologies transferred to industries based in Maharashtra for value addition and productivity enhancement

•	Dehydration of coriander foliage
•	Dipping oil formulation for grapes
•	Process know-how for Probiotic Carrot nectar
•	Fruit dehydration: Banana
•	Agro Technologies for Lotus (Namoh 108)
•	GM cotton tolerant against pink bollworm and its commercialization after deregulation
•	Floriguard: Herbal formulation to enhance the shelf life of cut flowers
•	Biopesticide solutions derived from microbial and phytochemical origins for sustainable pest management

Significant projects undertaken by CSIR in the area of precision farming and water conservation

- CSIR-National Environmental Engineering Research Institute (CSIR-NEERI), Nagpur has implemented “High Rate Transpiration System (HRTS)”, a land-based wastewater treatment system, at 04 industrial locations in Maharashtra (Chakan, Satara, Sanaswadi and Ahmednagar) to reduce the dependence on fresh water for maintaining green belts, with the excess treated water available for agricultural use. HRTS uses wide ridges and furrows, where trees with high transpiration capacity are planted on ridges and treated industrial effluent flows through furrows. The soil acts as a bio-physico-chemical reactor, removing pollutants through adsorption, ion exchange, and microbial degradation. This process enables wastewater reuse for irrigation, supports greenbelt development and climate-resilient agriculture.
- CSIR-NEERI successfully demonstrated an Engineered Constructed Wetland System (ECWS) for decentralized wastewater treatment at a farmer’s field in Pandherkawada (Maharashtra), with a hydraulic loading rate of 2 cu.m/day. This system treats untreated domestic sewage through natural processes, providing a sustainable and low-maintenance solution for rural and peri-urban communities. Natural filtration through gravel beds and vegetation, with zero-energy and low O&M requirements, makes ECWS ideal for off-grid locations and ensures year-round water availability for farmers, even during dry seasons. It provides a reliable source of treated water for irrigation, reducing dependence on groundwater, enhancing soil moisture retention, supporting crop diversification, and promoting nutrient recycling to improve soil fertility while reducing chemical inputs.
- CSIR has launched mission entitled “Region-Specific Smart Agrotechnologies For Enhancing Soil and Plant Health” in 2023 with an aim to develop a hybrid predictive, analytic cum modelling system integrated with agro-technologies to draw out field implementable intervention strategies to enhance farm productivity in select agro-ecosystems.
- The water requirements of 15-year old, and 5-year old orange trees were estimated and compared with the prevailing flood irrigation practices by CSIR-NEERI in the Narkhed Taluka of Nagpur district (Maharashtra) and Pandhurna Taluka of Chhindwara district (M.P.). The analysis revealed that the water requirement of these trees is much less than the water used in flood irrigation. Based on the study, farmers were suggested to adopt drip irrigation to reduce the water loss during flood irrigation, enhance water use efficiency, thereby contribute to improved agricultural productivity.
- CSIR-NEERI has carried out a watershed development and management study for the Tarali reservoir (Maharashtra). Analysis of primary and secondary data indicated that the present groundwater stage of development is 39.14% (Safe category), with scope for further improvement in groundwater resources. Based on morphometric analysis of the watershed, various soil and water conservation structures, such as check dams, contour trenches, farm ponds, and percolation ponds, have been proposed to reduce soil erosion from runoff and augment groundwater recharge.