

**GOVERNMENT OF INDIA
MINISTRY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF SCIENCE AND TECHNOLOGY
LOK SABHA
UNSTARRED QUESTION No. 3610
TO BE ANSWERED ON 22.3.2023**

POLICY TO ENCOURAGE YOUTH TOWARDS SCIENCE

†3610. SHRI JASWANT SINGH BHABHOR:

SHRI NAMA NAGESWARA RAO:

Will the Minister of SCIENCE AND TECHNOLOGY विज्ञान और प्रौद्योगिकी मंत्री be pleased to state:

(a) whether the Government is planning to frame new policies/schemes to encourage the students/youth towards the field of Science and Technology;

(b) if so, the details thereof along with the achievements made and the efforts put in place so far in this regard; and

(c) the details of the steps taken by the Government for promoting affordable/sustainable innovation in the field of Science and Technology especially helpful for agriculture sector?

ANSWER

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

**विज्ञान और प्रौद्योगिकी तथा पृथ्वी विज्ञान मंत्रालय के राज्य मंत्री (स्वतंत्र प्रभार)
(डॉ. जितेंद्र सिंह)**

(a) Yes Sir. Government has framed the policy to encourage the students/ youth towards the field of Science and Technology. The key elements of the policy are promoting the spread of Scientific temper amongst all sections of society and making careers in science, research and innovation attractive enough for talented bright minds.

The National Geospatial Policy notified on 28.12.2022 seeks to enable and support innovation, creation and incubation of ideas and start-up initiatives in the Geospatial sector, capitalising on the opportunities arising out of

continually evolving technology. The policy is aimed to encourage capacity development and education programs in the Geospatial sector the value and benefits of which is sustained in the long term. It also aims spread of Geospatial thinking and education to the young minds from school level onwards wherein there would be standardisation and certification of courses and skill sets in line with the global best practices."

(b) "Innovation in Science Pursuit for Inspired Research (INSPIRE)" Scheme of Department of Science and Technology (DST), aims to attract meritorious youth to study basic and natural sciences at the college and university level and to pursue research careers in both basic and applied science areas including engineering, medicine, agriculture and veterinary sciences. The ultimate aim is to expand the R&D base of the country.

INSPIRE - MANAK (Million Minds Augmenting National Aspirations and Knowledge) targets young students in the age group of 10-15 years and studying in class VI to X to promote creative thinking and foster a culture of innovation and attract them to study science and pursue research career. The nominations are sought from schools, by the Department, during specific period of the year, through online mode at E-Management of INSPIRE Award Scheme (E-MIAS) portal. Under INSPIRE-MANAK, in a financial year, ten (10.0) lakh ideas are targeted from more than five (05) lakh middle and high schools across the country, out of which one (1.0) lakh ideas are shortlisted for an initial award of Rs. 10000 /- each, directly into the bank accounts of the students through Direct Benefit Transfer for preparation of project/model/showcasing of idea. Since inception of the program a total of 16.38 lakh INSPIRE Awards have been sanctioned. About 47.02 % of the awardees are girls and 25.61% SCs/STs. The Department has so far conducted nine National Level Exhibition and Project Competitions (NLEPCs) starting from 2011. More than 6000 awardees have so far exhibited their projects/models in these exhibitions held so far.

INSPIRE Internship aims at providing exposure to the top 1% students at Class X Board level by organizing Science Camps either during summer or winter and provide opportunity to them to interact with Science icons from India and abroad, including Nobel Laureates, to experience the joys of scientific pursuit. These science camps nourish the curiosity of students in science, help them to think out-of-the box and attract students at an early age of 16-17 years to

choose science subjects for further studies. So far more than 4 lakh students have participated in the organised INSPIRE Internship Science camps and availed the opportunity to interact with the eminent scientists. More than 50 % of the beneficiaries are female.

Scholarship for Higher Education (SHE) aims to enhance the rate of attachment of talented youth to undertake higher education in science intensive programs by providing scholarships and mentoring through summer attachment with leading researchers. The scheme offers 12,000 Scholarships every year @ Rs 0.80 lakh per year for undertaking Bachelor and Masters level education in natural and basic sciences for the talented youth in the age group 17-22 years. So far 1.37 lakh students have been awarded the Scholarship for Higher Education (SHE) for pursuing Bachelor and Masters level education in natural and basic sciences. About 57 % of the awardees are female.

INSPIRE Fellowship is offered to 1000 students having secured 1st Rank in Basic & Applied Sciences including engineering, medicine, agriculture, veterinary at the University/ academic institute of national importance i.e. IITs, NITs, IISERs level examination as well as Inspire Scholars having secure 70% marks in aggregate at the MSc level who are eligible for admission to the PhD Program in any recognized university/ academic institutions in the country every year. The Fellowships are tenable for maximum 5 years (2 years as JRF and 3 years as SRF) or completion of PhD, whichever is earlier to pursue full-time PhD program. So far 9531 fellows have been awarded the INSPIRE Fellowship for pursuing Ph.D. Programme. About 63% of the awardees are female.

INSPIRE Faculty Fellowship provides opportunities to 100 post- doctoral researchers in the age group of 27-32 years for 5 years in both basic and applied sciences area including engineering, agriculture, veterinary and medicine every year. Aspirants having Ph.D. with consistent academic track record are considered on competitive basis. So far 1486 faculty fellows have been awarded the INSPIRE Faculty Fellowship for pursuing post-doctoral research, 29% of the awardees are female. Out of 1486 faculty fellows, 52% have secured a regular position.

DST- STUTI (Synergistic Training program Utilizing the Scientific and Technological Infrastructure) program was launched on a pilot scale in early

2022 for a period of one year to cater to human resource and its capacity building through open access to S&T Infrastructure across the country by organizing short term courses/ workshops on the awareness, use and application of various instruments and analytical techniques. As a complement to the various schemes of DST funding for expansion of R&D Infrastructure to deal with the demands of researchers, scientists, students, start-ups, manufacturing units, industries and R&D Labs, STUTI Program envisions a hands-on training program and sensitization of the high-end state of the art equipment as well as promoting transparent access and sharing of scientific equipment/ infrastructure. As of now, around 160 Science Awareness Programs have been held that has given exposure to over 8530 school students. 206 Trainings have been conducted to train more than 6840 researchers, from various academic organizations/ industry in different areas of S&T across the country.

DST supports nurturing of ideas and science, technology & innovation-based start-ups through its National Initiative for Developing and Harnessing Innovation (NIDHI) initiative. The NIDHI program includes EIR (Entrepreneur in Residence) – a fellowship support program and NIDHI PRAYAS (Promoting and Accelerating Young and Aspiring Entrepreneurs & Start-ups) Program - providing prototype grant to convert their ideas into prototypes. These programs aim to provide solutions to the pressing needs of the society and create new avenues for wealth and job creations.

Encouraging the youth in the field of Science & Technology is important aspect of the Department in all its programmes including International Co-operation programme. Joint research projects funded with various foreign countries provide opportunity for young researchers to work in these collaborative projects as Junior / Senior Research Fellow; Research Associate, Project Assistant, Project Associate etc. As part of collaborative research these research students get unique opportunities to live and work in an international context, to gain practical experience and to acquire professional skills. Department of Science & Technology has also supported mobility fellowships and visitation programs for young Indian scientists and researchers like HOPE Meeting; Lindau Nobel Laureates meetings; Asian Science Camp; Fellowship and Internship programs with Australia, France, Germany, Switzerland, S. Korea and USA. Such collaborative exchanges are envisaged as a source of mutual

cultural and professional enrichment for both the young researchers and their host institutions thereby building contacts between the next generations of researchers.

Department of Biotechnology (DBT) is encouraging youth and young scientists/researchers and students by providing studentship/fellowship under postgraduate teaching programme, fellowships for doctoral and post-doctoral research for Indian students. The following Programmes are implemented by Department for encouraging students/youth:

Postgraduate Teaching Programme (M.Sc./ M. Tech./M.V.Sc.): Department of Biotechnology has implemented 70 postgraduate teaching courses in 62 universities and institutions across the country, offering general biotechnology courses and specialized courses such as medical, agricultural, marine, veterinary, industrial, food and pharmaceutical biotechnology, and human genetics. For encouraging the R&D activities, Department is providing thesis grant of Rs. 50,000/- per student for in-house dissertation work of 6 months duration as an integral part of post graduate degree to ensure hands on training.

DBT-Junior Research Fellowship Programme (DBT-JRF): Department is providing 500 fellowships per year for pursuing research in universities and / or research institutions in the country. The students are selected through Biotechnology Eligibility Test (BET) conducted at national level.

DBT-Research Associateship Programme (DBT-RA): DBT Research Associateship programme provides 100 fellowships per year for post-doctoral research in frontier areas of Biotechnology and life sciences at premier institutions in India including 25 fellowship for NER candidates.

M K Bhan Young Researchers Fellowship Programme: The Department has instituted M K Bhan–Young Researcher Fellowship Programme (MKB-YRFP) in 2020-221 with an aim to encourage young bright researchers to continue their research in the country after PhD. The scheme is to offer an independent research grant to young Post-Doctoral Fellows for three years, so as to enable them to emerge as future leaders and take up cutting edge research focused on issues of national relevance. This fellowship is awarded for research work to be carried out at DBT Autonomous Institutes only. Till now Department has selected 73 candidates under this fellowship program.

Ramalingaswami Re-entry Fellowship: The aim of the programme is to encourage researchers (Indian Nationals) working outside the country, who would like to return to the home country to pursue their research

interests in Life Sciences, Modern Biology, Biotechnology, and other related areas. The scheme has attracted talented pool of scientists below 45 years of age to pursue mainstream research in various host institutes in India. Since inception in 2006-07, more than 550 fellows have joined the fellowship program and around 400 of them have secured the regular positions in the Indian institutions.

Council of Scientific and Industrial Research (CSIR) through its National S&T Human Resource Development Programme has been providing doctoral and postdoctoral fellowships to young budding researchers through its various fellowship programmes such as JRF-NET, SPMF, SRF-Direct, Research Associateships and CSIR-NPDF. These young researchers are basically involved in science and technology development. The main objective of the National S&T Human Resource Development programme is to nurture the budding scientific talent (Young science and engineering graduates/students) and to nourish the objective of pursuit of scientific research. Annually CSIR offers fellowships to young students who are going to be future scientists. At any given time, CSIR supports about 9000-9500 young researchers in their pursuit for doctoral and postdoctoral research in the field of science and technology. Apart from the doctoral and postdoctoral fellowship programmes, the CSIR has been engaged in connecting school students with scientists through its “Jigyasa” (student-scientist connect) program which was initiated in 2017. The programme envisages opening up the national scientific facilities to school children, enabling CSIR scientific knowledgebase and facility to be utilized by school children to develop ‘Scientific Temper’ in the young minds. The Jigyasa program is being implemented through CSIR laboratories. More recently, CSIR has signed MoU with NVS (Navodya Vidyalaya Samiti) and Atal Innovation Mission of NITI Aayog to further accelerate the Student-Scientist outreach program of CSIR.

Under Science and Engineering Research Board (SERB) supported programs and schemes, scholars at various levels were engaged in Research and Development activities. Through Accelerate Vigyan Scheme, SERB supports the potential postgraduate and Ph.D. level students in selected areas/disciplines/fields to participate in Science and Technology activities through high-end workshops, training, and skill internship programmes. Through SERB- SSR (Scientific Social Responsibility) policy, Grantees foster the research culture among the students through research internships, delivering

scientific awareness lectures, and research facility training, for the benefit of youth in science. Under the International travel support (ITS) scheme, SERB provides support to young scientists (below 35 yrs) to attend International training programs, short-term schools, workshops and conferences.

Ministry of Earth Sciences (MoES) implements International Training Centre for Operational Oceanography (ITCOcean) and Program for Development of Skilled manpower in Earth System Sciences (DESK) under the umbrella scheme Research, Education and Training Outreach (REACHOUT) for capacity building in Earth Sciences.

(c) The steps taken by the Government for promoting affordable /sustainable innovation in the field of Science and Technology especially helpful for agriculture sector are as follows:

Department of Science and Technology (DST), under the Scheme for Young Scientists and Technologists (SYST), provides research opportunities to young scientists and technologists to take up Science & Technology (S&T) based projects for affordable and sustainable innovations to address societal challenges with lab-to-land approach from across the country. The young researchers are encouraged to align themselves with academic institutes, Research and Development (R&D) laboratories or S&T driven Voluntary organizations to address local challenges using new and emerging areas as indicated below:

- Artificial Intelligence, Robotics and IoT for Societal Application in Agriculture, Rural Development, Disaster Management and Health**
- Nutritional Supplements and Value-added Food Products for Humans and Animals**
- Plant-Based Health Products, Scientific Validation and Upscaling of Traditional Knowledge Systems**
- Cost-Effective Health and Hygiene Aids**
- Effective Indigenous Methods of Disease Identification and Monitoring**
- Natural Resource-Based Livelihood Systems**
- Agricultural Tools and Agriculture Produce**
- Income Augmenting Agricultural Practices.**

Environment Sustainability & Renewable Energy • Additive Manufacturing

In the last five years, 165 young researchers have been supported, and various technologies/technology packages for the benefit of society have been developed.

DST under National Mission on Interdisciplinary Cyber Physical Systems (NM-ICPS), 25 Technology Innovation Hubs (TIHs) have been set up in academic

institutions of repute across the country. These Hubs work as canterers of excellence with core expertise in various advanced technology verticals. DST supports entrepreneurship across various domains including agriculture sector through various components of National Initiative for Developing and Harnessing Innovation (NIDHI) wherein funding support is provided to eligible innovators and startups for prototyping, product development, validation, commercialization etc. These programs are supported through Technology Business Incubators (TBIs).” DST under the Water Technology programme has supported 7 Water Technology Research and Innovation Centres (WATER-IC) all over India to address the gap areas in Water Technology research, development, demonstration, adaptation, adoption and commercialization of water and to create Joint Virtual Networked Centres which will enable capacity building of Indian scientists from academia and laboratories to carry out joint research activities by leveraging existing infrastructure and funding through linkages established by a virtual networked centre. These centres are being implemented by premier institutes like Indian Institute of Technology(s), Indian Institute of Science. The Indo-U.S. Science and Technology Forum (IUSSTF) have partnered to nurture cooperation between students and scientists from India and USA in the area of water through Water Advanced Research and Innovation (WARI) Fellowship Program which is a dynamic and transformative program developed to foster long term Indo-American science and technology partnerships. WARI has supported fellows and interns, during its two phased duration. Water Quality Monitoring Networks in 3 States in partnership with relevant stakeholders has also been set up by DST which function through capacity building of water managers and stakeholders.

Indian Council of Medical Research (ICMR) has set up Medical Device and Diagnostic Mission Secretariat (MDMS) at ICMR HQ to promote affordable and sustainable biomedical innovation by fostering ‘Make-in-India’ product development of medical device & diagnostic technologies. ICMR is fostering collaboration with IITs for technology development by setting up ICMR-DHR-Centres of Excellence (CoEs) at 7 IITs across the country. These CoEs aim to foster strategic ‘Make-in-India’ product development in synergise with the requirement of the National Health Missions, Ayushman Bharat-Health and Wellness Centres and Public Health programs of Government of India for major public health impact. Launch of "ICMR-DHR Policy document for Innovation and Entrepreneurship” for Medical Professionals, Scientists and technologist at

Medical /Dental/ Para Medical Institutes/ Colleges and allied Biomedical Research and Academic Institutions by Honorable Union Health Minister. ICMR-Centre for Innovation and Bio-Design (CIBioD) at PGIMER, Chandigarh aims to emerge as an innovation centre for designing and developing indigenous technologies, instruments and devices for affordable healthcare. Setting up of ICMR-DHR-Large Animal House Facility at AMTZ, Vizag in MedTech sector and ICMR- National Animal Resource Facility for Biomedical Research at Hyderabad.

Indian Council of Agricultural Research (ICAR) - Indian Agricultural Research Institute (IARI) is working on development of sustainable apiculture technologies such as resource use efficient and climate resilient crops, microbe-based technologies to minimize chemical fertilizers, solar based storage systems and conservator agriculture technologies etc.

CSIR has adopted several measures to promote affordable and sustainable innovations in the field of science and technology. CSIR is implementing basic as well as translational projects in various categories for the purpose. Brief details of few significant initiatives/ technology developed by CSIR in recent past which is especially helpful for agriculture sector is at Annexure-I.

Biotechnology Industry Research Assistance Council (BIRAC), an industry-academia interface agency of the Department of Biotechnology, Government of India, through its various schemes supports all stages of product development right from proof-of-concept demonstration to product commercialization in all the thematic areas including Agriculture. Steps taken by BIRAC to develop Agri startup ecosystem in the country include setting up bioincubation centres for Startups, funding and business mentoring of startups through accelerator programs. Also, BIRAC has set up 75 bioincubation centres across 21 states/UTs of the country. Of these, 18 bioincubation centres are focused on Agriculture & allied areas. Under the area of Agriculture (Plants and Crop sciences), about 170 projects have so far been supported under SBIRI, BIPP and PACE schemes. Under Biotech Ignition Grant (BIG) scheme has funded 93 startups in the Agriculture domain.

The Technology Research Board (TRB), MoES is specifically oriented towards indigenous development of technologies in the multidisciplinary field of Earth Sciences. The TRB is mandated to facilitate, promote, guide and implement the development of indigenous technologies till dissemination.

Annexure-I

S No.	List of technologies related to Agriculture Sector developed by CSIR in recent past	
1.	Compost booster for cold regions	<ul style="list-style-type: none"> • Technology transferred to NGO's, Panchayat level, Army headquarters for the deployment of technology in high altitude areas • Technology deployed in two Cluster; one in Sikkim and One in Himachal Pradesh • Improved income for families of selected 400 beneficiaries through SFURTI scheme of MoSME. Farmers can earn additional income Rs. 30,000/ year by selling enriched compost
2.	Shitake mushroom: vitamin D2 enriched	<ul style="list-style-type: none"> • Technology transferred through MSME's to clusters in Sikkim for farmers livelihood promotions • Technology deployed in three clusters and six entrepreneurs • Improved income for families of selected 750 beneficiaries through SFURTI scheme of MSME. Farmers can earn additional income Rs. 50,000/ year by selling fresh and dry shiitake
3.	Damask rose (Rosa damascena): agro-and processing technology	<ul style="list-style-type: none"> • Under "CSIR Aroma Mission" 2816 hectare brought under cultivation in 11 states and two UT, generating revenue of Rs. 31.27 crores. • 1st time large scale cultivation of Saffron in H.P. Lauded by Hon'ble C.M., H.P. Capacity building for 189 farmers.
4.	Wild marigold (Tagetes Minuta): agro-and processing technology	
5.	Lavender (Lavandula officinalis): agro- and processing technology	
6.	Rosemary (Rosmarinus officinalis): agro and processing technology	
7.	Agro-technology for mass production of saffron (Crocus sativus L.)	
8.	German chamomile (Matricaria chamomilla): agro and process technology	

9.	Improved bee hive for quality and hygienic extraction of honey	<ul style="list-style-type: none"> • Technology deployment through clusters for integration of apiculture in floriculture through "CSIR Floriculture Mission • Eleven bee keeping clusters (20 famers in 10 clusters and 10 farmers in 1 cluster) were formed in Himachal Pradesh and Uttarakhand
10.	Lilium: agrotechnology	<ul style="list-style-type: none"> • Planting material is provided to farmers, NGOs, Government schools, colleges, hospitals and other offices for technology deployment and awareness • "Under Floriculture Mission" 250-hectare area brought under cultivation of floriculture crops benefitting 1004 farmers.
11.	Calla lily: agrotechnology	
12.	Gerbera: agrotechnology	
13.	Agro-technology of carnations	
14.	Alstroemeria: agrotechnology	
15.	Cut-roses: agrotechnology	
16.	Chrysanthemum: agrotechnology	
17.	Octa-Copter Drone for Agri	<ul style="list-style-type: none"> • NAL has developed a modular Oct-Copter UAV system that can carry a maximum payload of 20 Kg and fly for the endurance of around 20 min. • <i>Agri Application:</i> NAL has developed a modular Oct-Copter UAV system that can carry a maximum payload of 20 Kg and fly for the endurance of around 20 min. The Oct-Copter has a provision to house either a hyperspectral camera for crop health monitoring or a fertilizer. First field demonstration of NAL's Oct-Copter has been carried out for the farmers of Alur APMC, Bangalore. • <i>Medical Applications @ Bengaluru:</i> CSIR-NAL has teamed with Department of Health & Family Welfare, Govt. of Karnataka for aerial delivery of covid-19 vaccine's in remote area. The Octacopter has successfully delivered 50 vials of Covid-19 vaccines along with syringes in a special container from Chandapura PHC to Haragadde PHC on 13th November 2021. • <i>Medical Applications @ Jammu:</i> CSIR-NAL has teamed with CSIR-IIIM, Jammu and Department of Health & Family Welfare, Govt. of Jammu for aerial delivery of covid-19 vaccine's in remote border area. The Octacopter has successfully delivered 50 vials of Covid-19 vaccines along with syringes in a special container from IIIM-Jammu to Sub-District Hospital, March on 27th November 2021.
18.	Aromatic crops	<ul style="list-style-type: none"> • Area Covered under cultivation of aroma crops: ~27,000 hectares

		<ul style="list-style-type: none"> • States covered: 29 • Tribal Clusters developed:20 • On the farm processing/distillation units:300 • Training/awareness/skill development programmers organized:1124 • Farmers benefitted: ~65,000 • Rural employment generated:12 lakh man days • Farmers income enhancement: Rs 30,000 – 70,000/- per hectare per year • Purple Revolution by catalysing Lavender Cultivation in J&K, which is a high value commodity: cultivation in 10 districts of J&K, Increase in the farmer's income from Rs. 20,000/- to Rs. 200,000/- per acre per year. • Atmanirbharata in Lemongrass essential oil: From being one of the importers of Lemongrass essential oil a few years back, India has now become one of the largest exporters in the world with annual export of 300-400 tonnes Lemongrass essential oil worth Rs. 35-40 crore. Farmers are earning the income of Rs. 30,000/- to 70,000/- per hectare per year depending upon the water availability and environmental conditions • Golden revolution in Himachal Pradesh: Introduction of improved varieties 'HIMGOLD' and 'HIM SWARNIMA' of wild Marigold (<i>Tagetes minuta</i> L.) yielding high grade aromatic oil. Total essential oil production in the country is 6.5 tonnes, which has enhanced the farmers' income 2.5 times over traditional crop
19.	Floriculture crops	<ul style="list-style-type: none"> • Area brought under cultivation of Floriculture crops: 750 hectares • State covered: 21 • Indigenous development of Tulip bulb production initiated in Lahaul & Spiti has helped reduce the import of quality planting material. • Apiculture integration with Floriculture in collaboration with KVIC: 49 clusters established
20.	Improved Samba Mahsuri (RP BIO 226): a bacterial blight disease resistant and low GI (diabetic friendly) rice variety	<ul style="list-style-type: none"> • Similarly, ISM Rice variety has influenced the lives of farmers across our country uniformly at all such places where bacterial blight has been a serious threat to paddy cultivation
21.	Varieties of crops of Lemon grass	<ul style="list-style-type: none"> • Several varieties of aromatic crops developed by Institute have been extended to farmers in different parts of country under Aroma Mission enhancing the income of farmers.
22.	Portable NPK soil analysis	<ul style="list-style-type: none"> • It helps farmers to improve productivity
