Department of BioTechnology, Government of India

सत्यमेव जयते

BioE3 Biotechnology for Economy, Environment & Employment

birac Ignite Innovate Incubate

DBT-BIRAC Joint Call for Proposals on 'Climate Resilient Agriculture' for Fostering High Performance Biomanufacturing under BioE3 Policy

1. Background

The **BioE3** (**Bio**technology for **E**conomy, **E**nvironment & **E**mployment) **Policy** for '*Fostering-High Performance Biomanufacturing*' has been approved by Union Cabinet in August 2024. The policy lays down the framework for high-performance Biomanufacturing, to accelerate the development and scale up of Bio-based products in the country. Biomanufacturing can fundamentally transform the global economy from today's consumptive manufacturing paradigm to the one based on regenerative principles, and will play a pivotal role promoting in '*Green Growth'* while driving country's Bioeconomy.

2. Scope of The Call

Climate Resilient Agriculture has been identified as one of the thematic sectors under the BioE3 Policy for '*fostering high-performance biomanufacturing'*. India's agriculture sector is pivotal in ensuring the nation's food security and economic growth. However, environmental perturbations are altering optimal crop-growing regions, creating uncertainty in agricultural outcomes. As global population growth increases demand for food, feed, fiber, and feedstock under challenging climate conditions, agriculture exerts an outsized impact on land-use change, biodiversity loss, agrochemical overuse, water depletion, and greenhouse gas emissions. Addressing these challenges requires advanced biotechnology and concerted action in minimizing environmental footprint of Agriculture, developing bio-based alternatives to chemical agri-inputs, securing high yield with minimal inputs & transforming agricultural fields into carbon sinks.

Hence, DBT and BIRAC, intend to foster an innovative ecosystem for enabling development and deployment of sustainable & scalable, industry ready technologies to revamp the agricultural value chain from farm to fork to landfill by prioritizing climate resilient strategies leveraging technological innovations including precision

genomics/genome editing, synthetic biology, advanced engineering of free living/symbiotic microbiota, in field imaging, artificial intelligence and bio-based agri-solutions.

In view of this, DBT and BIRAC invite proposals on '*High Performance Biomanufacturing for Climate Resilient Agriculture'* to develop technologies and bio-based solutions for climate resilient circular Agri-economy. The proposals will be invited under the two categories:

(i) Discovery & Application-oriented Integrated Network Research

(ii) Bridging the Gaps for Industrial scale up

2.1 Discovery & Application-oriented Integrated Network Research

Under this category, the proposals are invited to develop proof-of-concept and/or translation of leads to demonstrate biotechnological and bioprocess solutions for 'Climate Resilient Agriculture' in controlled settings (laboratory, green house conditions, growth chambers). The established PoC should have the potential for scale up and field deployment with a sustainable advantage over the existing technologies. The proposals may be focused on the following, including but not limited to:

- Establish PoC for engineering of rhizosphere/endosphere/phyllosphere of crop plants for better growth, enhanced input use/acquisition efficiency, biotic/ abiotic stress resilience and carbon sequestration.
- Breeding climate resilient crops for revamping the plant architecture, improving input use/acquisition efficiency by employing genomic selection and/or SDN1/SDN2 based genome editing.
- Accelerated domestication of wild-relatives/land races of crops for enhanced climate resilience.
- Development of genomics-led bioprotection & biostimulant molecules and working out the mechanism of action of the active ingredients.
- Novel formulations/delivery systems for Agri-biologicals.
- Al & ML based peptide/protein prediction platforms and validation of their potential to serve as novel Agribiologicals
- Synthetic biology approaches for making pheromones and other plant protection chemicals.

2.2 Bridging the Gap for Scale up

Under this category, the focus would be on scale up of technologies with established PoC that have reached the early validation stage and are ready for late stage validation/scale-up for field deployment.

- Up-scaling of Bio-based Generics with proven market cap including biocontrol Agents (Abamectin, Emamectin, Milbemectin, Spinosad etc.); Plant Hormones (Auxins, GAs, Cytokinins, ABA, Brassinosteroids, JA, Strigolactones etc); Pheromones etc.
- Validating and advancing existing proof of concept for molecules/strains/technologies available in laboratory set ups for scalable production & delivery of :
    i. Biocontrol agents (based on secondary metabolites, proteins, peptides, dsRNA/microRNA, insect and plant extracts etc.)
    ii. Biofertilizers leading to measurable enhancement in plant yield (consortia-based formulations with field level testing including but not limited to free living microbes with ability to colonise roots and fix N_2; phosphate solubilising bacteria and microbes for improving soil structure)
    iii. Biostimulants (based on proteins & peptides, secondary metabolites and biological extracts with proven benefit for plant growth and productivity under diverse environmental conditions)
- Scaling up indigenous technologies for delivery of Agri-biologicals
- Precision agriculture including in-field, drone-based imaging and sensor-based technologies to monitor (real-time) plant stress (both biotic and abiotic) and growth parameters for optimal input application.
- Harnessing big data and deployment of machine learning tools for disease prediction/diagnosis for effective disease management in crop plants
- Developing indigenous vectors and novel tools for precise genome editing
- Demonstrating absence of exogenous integrated DNA in advanced-stage genome edited lines with existing PoC for climate resilience (in line with Standard Operating Procedures (SOPs) for regulatory review of genome edited plants under SDN-1 and SDN-2 categories 2022).

3. Key Requirements for the Proposed Projects:

The proposed study should mandatorily indicate the following aspects in the proposal:

a. Name of the background strain/variety, procurement source, IP associated with the strain or tools used, if the strains are genetically modified
b. Present TRL level of the technology and the TRL proposed to be attained at the end of project duration.
c. Outline the minimal benchmark (titer/productivity/scale) proposed to be attained for the selected bio-based Agri-input/product.
d. Gap in the technology to be addressed and strategies proposed to address the gap
e. Framework for toxicity studies, quantification of residue in produce, sustainability of the process from an economic and environment point of view
f. Scalability of the technology and its commercialization potential
g. All proposals must adhere to statutory regulatory requirements.

4. **Mode of Submission**

Proposals maybe submitted by both Academia and Industry applicants, either independently or as a collaborative project.

a. For proposals from Academia/Research Institutions: Interested applicants should submit the proposals in the prescribed format duly forwarded by the executive head of the institution through the Department's e-ProMIS portal (www.dbtepromis.nic.in).
b. For proposals from Industry and Industry-Academia collaboration: Interested applicants should submit the proposals in the requisite format duly forwarded by the executive head of the Company/LLP/Institution by logging to the BIRAC website (www.birac.nic.in).

5. Eligible Organizations

5.1 Academic Organisations

a. Proposals may be submitted by interested applicants engaged in research activities at various Institutions/Universities/Societies/Trusts/NGOs/ Foundations/Voluntary Organizations, recognized as a Scientific and Industrial Research Organization (SIRO).

b. The Principal investigator must have at least four years of the employment remaining in the institution at the time of proposal submission.

5.2 Industry

a. Eligibility criteria for the Industries will be as per “Implementation Plan for the Biomanufacturing and Biofoundry Initiative” attached at ANNEXURE I.

b. Pre-requisite documents required to be submitted by the Industry as per the BIRAC norms are as follows:

5.3 Companies/Startups

a. Incorporation certificate.

b. CA/CS certified shareholding pattern as per BIRAC format (Companies having a minimum of 51% Indian shareholding / individuals holding Indian passports are only eligible) mentioning UDIN number.

c. Details regarding in-house R&D facility, if any; or Incubation Agreement with recognized Incubator.

d. Audited financial details of latest last three financial years,

e. Copy of passports of the shareholders if required (in support of 51% eligibility criteria).

5.4 Limited Liability Partnership

a. Incorporation/Registration Certificate.

b. Partnership deed; CA/CS certified certificate which states that minimum half of the partners are Indian citizens mentioning UDIN number.

c. Copy of passports of Indian partners/subscribers

d. Research mandate/ details regarding in-house R&D facility, if any/Incubation agreement

e. Audited financial details of the last three financial years;

Companies/LLP if recommended have to provide a declaration stating that Company/LLP is not in default of BIRAC OR any other organization. Further there are no Legal Proceedings going against the applicant.

6. Evaluation Criteria

The proposals will be evaluated as per existing norms of DBT and BIRAC.

7. Funding Modalities

a. Projects having academic partners only will be funded by DBT. Projects involving Academia and Industry or only Industry will be supported by BIRAC.

b. Extent of funding will depend on the proposed activities and will be in alignment with the “Implementation Plan for the Biomanufacturing and Biofoundry Initiative” attached at ANNEXURE-1.

c. Project duration will be upto 2 years, extendable upto 5 years based on the performance.

8. Scope of Intellectual Property Generated During the Duration of the Project

The Intellectual Property (IP) generated during the duration of the project will be in accordance with the IP Policy of DBT and BIRAC.

9. Discretion

DBT/ BIRAC shall reserve the discretion on determination of sanction of funding and processes as per its standard norms and such determination shall be final. The selection process is not open to review.

10. Contact Information

Any queries may be addressed to the e-mail: biomanufacturing.cra@dbt.nic.in

Last date for submission of proposals is 30th April, 2025.

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