



Research and Development Institution

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Expression of interest

of INCDSB to join a Consortium on HORIZON EUROPE calls

CALL - FAIR, HEALTHY AND ENVIRONMENT-FRIENDLY FOOD SYSTEMS FROM PRIMARY PRODUCTION TO CONSUMPTION (HORIZON-CL6-2024-FARM2FORK-01)

HORIZON-CL6-2024-FARM2FORK-01-2: New healthy and sustainable food products and processes

HORIZON-CL6-2024-FARM2FORK-01-4: Climate change and food safety: effects of climate change on food safety across food systems

HORIZON-CL6-2024-FARM2FORK-01-7: Impact of the development of novel foods based on alternative sources of proteins

HORIZON-CL6-2024-FARM2FORK-01-8: Preventing and reducing food waste to reduce environmental impacts and to help reach 2030 climate targets

CALL - FAIR, HEALTHY AND ENVIRONMENTALLY-FRIENDLY FOOD SYSTEMS FROM PRIMARY PRODUCTION TO CONSUMPTION (HORIZON-CL6-2024-FARM2FORK-02-TWO-STAGE)

HORIZON-CL6-2024-FARM2FORK-02-2-two-stage: Sustainable organic food innovation labs: reinforcing the entire value chain

HORIZON-CL6-2024-CircBio-02-4-two-stage New circular solutions and decentralised approaches for water and wastewater management

HORIZON-CL6-2024-FARM2FORK-02-6-two-stage: Minimising climate impact on fisheries: mitigation and adaptation solutions for future climate regimes

CALL - CIRCULAR ECONOMY AND BIOECONOMY SECTORS (HORIZON-CL6-2024-CIRCBIO-01)

HORIZON-CL6-2024-CircBio-01-2: Circular solutions for textile value chains based on extended producer responsibility

HORIZON-CL6-2024-CircBio-01-4: Systemic circular solutions for a sustainable tourism

HORIZON-CL6-2024-CircBio-01-5: Programmed biodegradation capability of bio-based materials and products, validated in specific environments

HORIZON-CL6-2024-CircBio-01-6: Digital information systems for bio-based products

HORIZON-CL6-2024-CircBio-01-10: Targeting aquatic extremophiles for sourcing novel enzymes, drugs, metabolites and chemicals

CALL - CIRCULAR ECONOMY AND BIOECONOMY SECTORS (HORIZON-CL6-2024-CIRCBIO-02-TWO-STAGE)

HORIZON-CL6-2024-CircBio-02-5-two-stage: Circular design of bio-based processes and products

CALL - CLEAN ENVIRONMENT AND ZERO POLLUTION (HORIZON-CL6-2024-ZEROPOLLUTION-01)

HORIZON-CL6-2024-ZEROPOLLUTION-01-2: Best available techniques to recovering or recycle fertilising products from secondary raw materials

HORIZON-CL6-2024-ZEROPOLLUTION-01-3: Environmental impacts of food systems

CALL - LAND, OCEAN AND WATER FOR CLIMATE ACTION (HORIZON-CL6-2024-CLIMATE-01)

HORIZON-CL6-2024-CLIMATE-01-4: Land use change and local / regional climate

CALL - INNOVATIVE GOVERNANCE, ENVIRONMENTAL OBSERVATIONS AND DIGITAL SOLUTIONS IN SUPPORT OF THE GREEN DEAL (HORIZON-CL6-2024-GOVERNANCE-01)

HORIZON-CL6-2024-GOVERNANCE-01-1: Additional activities for the European Partnership for a climate neutral, sustainable and productive Blue Economy

Organization details:

Country: Romania

Name of the organization: National Institute of Research and Development for Biological Sciences
Bucuresti

Contact persons short description and contact details:

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Short description of the organization

Incl. cooperation with other research, industry, business etc., profile of the main researchers, previous research projects related to the topic (last 3 years)

INCDSB's mission is excellence in life sciences research, assumed through the process of integrating interdisciplinary institutional research in the three core directions: 1) biomedicine / health, 2) agriculture, nutrition and food safety, respectively 3) environment and biodiversity and to ensure trans-disciplinary approach by four complementary fields (bioanalysis, bioinformatics, biotechnology and bioproducts and research in extreme environments) to the mentioned core directions.

INCDSB's vision is to contribute, through cooperation with local and international partners to the understanding of the life processes and to provide sustainable solutions to the challenges occurring as result of environmental problems, health, depletion of natural resources, nutrition, etc.

INCDSB aim to contribute to the achievement of the European Union's objectives on sustainable, knowledge-based development. Thus, through its inter- and trans-disciplinary research activities, INCDSB participates in achieving the objectives related to:

- (1) promoting strategic autonomy, by creating key-value chains to accelerate the green transition and focusing technologies and innovation on human needs;
- (2) the ecosystems and biodiversity restoration; sustainable management of natural resources to ensure food security and a clean and healthy environment,
- (3) the transition to a sustainable European economy according to the principles of Europe's economic circularity and climate neutrality.

INCDSB activity is highly centered to socio-economic aspects and sustainability, and we are aiming, through the implemented projects, to support plans and strategies regarding the consumers safety and to protect and preserve the environment and ecosystems services, the development of the entrepreneurial capabilities and business environment and to sustain the local economic potential by creating opportunities to provide jobs (especially rural areas), thus contributing to increasing the quality of life.

Through its projects, INCDSB has established networks, associations, partnerships and can create a regional collaboration network as a framework.

Possible main contributions of organization to the project proposal

- Work Package leader
- Task leader

Research see "specific expertise"

Elaboration of methods and analytical protocols for assessment of secondary metabolites, assessment of contaminants/pollutants, elaboration of models supporting understanding of the pathway of action of different types of (bio)active compounds or the faith of nutrients and contaminants on various ecosystems; elaboration of local strategies for environment management

and sustainable use of resources thus supporting the reducing of environmental impact are domains defining INCDSB's expertise. Also, we have competencies and wide experience in development of the (bio)technologies for durable natural resources exploitation - including capitalization of raw-materials, bioproducts, wastes, technical assistance and support of knowledge transfer to ensure efficient implementation of developed technologies towards industrial stakeholders.

Additional fields of expertise are covered by (1) Extraction and characterization of natural polymers from various animal sources; (2) designing of biomaterials using the CELLINK BIO X 3D Printer; (3) In vitro biocompatibility testing of bio-based polymers and composites according to international standards SR EN ISO 17025:2005 and ISO 10993-5; (4) Structural analysis of bio-based polymers and composites by SEM and TEM; (5) Analysis of cell-biomaterial interaction by fluorescence microscopy and specific marker identification; (6) analysis of gene expression by PCR/RT-PCR; (7) analysis of cell cycle, cell viability and proliferation, cell apoptosis and intracellular ROS production by flow cytometry;

Specific expertise

INCDSB has strong expertise in its research fields due to its human resources and modern infrastructure (<https://eeris.eu/ERIO-2000-000R-0174>), which facilitates the development of innovative ideas and the achievement of the proposed objectives.

In our research we aim to capitalize plant and animal products and by-products potential as regenerable resources; new sensors/biosensors with applicability in the food industry; determination/monitoring of pollutants; new membrane technologies with advantages such as high efficiency and low cost in bioseparation and for purification and recovery of valuable compounds from medicinal plants; bioproducts and by-products from the agricultural and food industries; new biomaterials with multiple applications. We are an interdisciplinary team of engineering, biology and chemistry professionals, a team that can provide solutions and technical/scientific approaches tailored to the needs of our partners and/or clients from academia, government agencies, industrial/commercial companies, foundations and SMEs at home and abroad.

Together, we formulate responses to agricultural, health, food industry and environmental emergencies by developing and validating new techniques for the identification, characterisation, extraction, concentration and stabilisation of bioactive compounds from raw materials, by-products or residues from primary processing, but also for the analysis of compounds that can be used as nutrients, food supplements/cosmetics/beverages and for the determination of target analytes using sensors/biosensors.

Also, we have expertise in designing of biocompatible and biodegradable biomaterials based on natural and synthetic polymers, ceramics, bioactive compounds of vegetable origin for tissue engineering and regenerative medicine of different tissues, such as skin, bone, cartilage, peripheral nerves, corneas); development of nanoparticles and nanostructured systems for biomedical applications; development of in vitro experimental models for biomaterial biocompatibility testing and tissue healing process study (anti-inflammatory, anti-aging, antioxidant activity) as an alternative to animal experiments; extraction, purification and analysis of biologically active compounds from animal and plants sources; valorization of animal and vegetable wastes for

obtaining products with added value within the circular bioeconomy; development of natural products with applications in agriculture as biopesticides, biofungicides or crop stimulators.

Relevance of expertise/previous research:

Recent grants are proving the existing technologies and INCDSB capabilities:

- Competitiveness Operational Program (POC), priority axis 1 "Research, technological development and innovation (CDI) in the field of economic competitiveness and business development" within action 1.2.3 "Partnerships for knowledge transfer" project number 83/2016 (2016-2022), "Innovative methods to capitalize natural resources and improving the nutritional efficiency of phyto-products - a contribution to increasing the competitiveness of small businesses"; <https://www.incdsb.ro/p/FITOCOMP/index.html>
- Competitiveness Operational Program (POC), priority axis 1 "Research, technological development and innovation (CDI) in the field of economic competitiveness and business development" within action 1.2.1 Stimulating the demand of enterprises for innovation, project number 365/2021 (2021-2023), "Biopolyols obtained through an unconventional technology for recycling plant waste";
- Research projects to stimulate young independent teams (TE), project number 106/2022 (2022-2024), "Analytical approach to understanding the positive synergistic effects of melatonin on the polyphenolic profile and antioxidant capacity"; <https://www.incdsb.ro/p/MEL-ANTIOX/>
- Experimental Demonstration Project (PED), PN-III-P2-2.1-PED-2021, project number 645/2022 (2022-2024), "Phytonutrients based on phytocomplexes enriched with phytoestrogens and having the potential to be used in the treatment of metabolic diseases"; <https://www.incdsb.ro/p/Phyto-ESM/>
- Experimental Demonstration Project (PED), PN-III-P2-2.1-PED-2021, project number 656/2022 (2022-2024), "Electronic tongue based on nanocrystalline graphene for testing extra virgin olive oil";
- Experimental Demonstration Project (PED), PN-III-P2-2.1-PED-2019, project number 362PED/2020 (2020-2022), "The development of new phytoproducts with high bioactive potential using polyphenolic complexes from plants and plant by-products"; <https://www.incdsb.ro/p/nphytbioact/>
- Complex Project in CDI consortia (PCCDI): Closing the bioeconomy value chains by manufacturing market demanded innovative bioproducts (PRO-SPER), 10PCCDI/2018 <http://icechim-rezultate.ro/proiect.php?id=51&lang=ro>
- Complex Project in CDI consortia (PCCDI): Complex valorisation of Black Sea region bioresources by developing and applying innovative and emerging biotechnologies (INOBIOMAR), 85PCCDI/2018 <http://univovidius.wixsite.com/inobiomar>
- Postdoctoral Research Project (PD): Novel multifunctional hydrogels based on marine- and herbal-derived compounds for modulation of chronic wound healing (HYDROSKIN), PD 3/2022 <https://www.incdsb.ro/p/Hydroskin/>
- Experimental Demonstration Project (PED): Biotechnology for a new Biomimetic composite hydrogel based on extracellular matrix components and Si-bioceramics enriched with small molecules (flavonoids) for the regeneration of osteochondral (BIOSICON), 261PED/2020 <https://www.incdsb.ro/p/biosicon/>
- Experimental Demonstration Project (PED): Functionalized mesoporous bioglass based 3D scaffolds for hard tissue regeneration (BIOSCAFTIS), 258PED/2020 https://www.icf.ro/pr_2019/BIOSCAFTIS/index.html
- EUREKA Traditional: Multifunctional products obtained from colostrum fermented by kefir grains (3-BIOTIC+), 62/2018 www.eureka-3biotic.pro-natura.ro

The research teams of INCDSB have a long experience by collaborative research projects (European projects, National projects, Industrial partnerships, etc.) that led to publications in highly recognized journals:

- *Novel Collagen-Polyphenols-Loaded Silica Composites for Topical Application, Pharmaceutics, 2023, doi:10.3390/pharmaceutics15020312.*

- *Green synthesis of bioinspired chitosan-ZnO-based polysaccharide gums hydrogels with propolis extract as novel functional natural biomaterials*, *International Journal of Biological Macromolecules*, 2022, doi: 10.1016/j.ijbiomac.2022.05.070.
- *Network analytics for drug repurposing in COVID-19*, *Briefing in bioinformatics*, 2022, doi: 10.1093/bib/bbab490.
- *Quality evaluation of commercial herbal products using chemical methods*, *Critical Reviews in Food Science and Nutrition*, 2022, doi: 10.1080/10408398.2022.2140120.
- *Electroanalysis of Naringin at Electroactivated Pencil Graphite Electrode for the Assessment of Polyphenolics with Intermediate Antioxidant Power*, *Antioxidants*, 2022, doi: 10.3390/antiox11122306
- *Synergism between Graphene and Molecularly Imprinted Polymers in Developing Electrochemical Sensors for Agri-Food and Environmental Analyses (2023)* *Chemosensors*, 11 (7), art. no. 380, DOI: 10.3390/chemosensors11070380
- *Cavitation-Effect-Based Treatments and Extractions for Superior Fruit and Milk Valorisation (2023)* *Molecules*, 28 (12), art. no. 4677, DOI: 10.3390/molecules28124677
- *The Influence of Melatonin Treatment in the Vinification of Feteasca Neagra and Cabernet Sauvignon Wines on the Profile of Polyphenolic Compounds and Antioxidant Activity (2023)* *Antioxidants*, 12 (6), art. no. 1214, DOI: 10.3390/antiox12061214
- *Different Extraction Approaches for the Analysis of Melatonin from Cabernet Sauvignon and Feteasca Neagra Wines Using a Validated HPLC-FL Method (2023)* *Molecules*, 28 (6), art. no. 2768, DOI: 10.3390/molecules28062768
- *Ternary water–organic solvent mixtures used for insecticide SPE extraction and analysis with acetylcholinesterase biosensor (2022)* *Analytical Biochemistry*, 654, art. no. 114843, DOI: 10.1016/j.ab.2022.114843
- *Rapid voltammetric screening method for the assessment of bioflavonoid content using the disposable bare pencil graphite electrode (2021)* *Chemosensors*, 9 (11), art. no. 323, . DOI: 10.3390/chemosensors9110323
- *Ester flavorants detection in foods with a bienzymatic biosensor based on a stable Prussian blue-copper electrodeposited on carbon paper electrode (2019)* *Talanta*, 199, pp. 541-546. DOI: 10.1016/j.talanta.2019.02.094
- *Development and Application of a HPLC-PDA-FL Method for the Determination of Melatonin and its Precursors in Infant Formulas (2018)* *Food Analytical Methods*, 11 (4), pp. 951-958. DOI: 10.1007/s12161-017-1068-y
- *Marine and Agro-Industrial By-Products Valorization Intended for Topical Formulations in Wound Healing Applications*. *Materials*, 2022, doi: 10.3390/ma15103507
- *Bioactivity and thermal stability of collagen-chitosan containing lemongrass essential oil for potential medical applications*. 2022, *Polymers*, doi: 10.3390/polym14183884
- *In vitro and in vivo evaluation of a biomimetic scaffold embedding silver nanoparticles for improved treatment of oral lesions*. *Materials Science and Engineering: C*, 2021, doi: 10.1016/j.msec.2021.112015
- *Enhanced wound healing activity of undenatured type I collagen isolated from discarded skin of Black Sea gilthead bream (*Sparus aurata*) conditioned as 3D porous dressing*. *Chemistry and Biodiversity*, 2021, doi: 10.1002/cbdv.202100293
- *Physicochemical and biological properties of gelatin extracted from marine snail *Rapana venosa**. *Marine Drugs*, 2019, doi: 10.3390/md17100589