

## Theme 1: Integrating safety and environmental sustainability impacts of bio-based solutions

### 1. **‘Environmental safety of biotechnological plant protection products based on short interfering RNA and peptides; ENSAFE’, DKK 59,999,991 over 6 years**

Main applicant: Nina Cedergreen, Department. of Plant & Environmental Sciences, University of Copenhagen

Co-applicants:

Jan Gorodkin, Department of Veterinary and Animal Sciences, University of Copenhagen

Jeppe Lund Nielsen, Department of Chemistry and Bioscience, Aalborg University

David Spurgeon, Department of Pollution, UK Centre for Ecology and Hydrology

Brief description:

Society is anticipating a rise in food demand, which makes the preservation of crop yields essential for food security, especially given the limited available land. Chemical pesticides have been the primary tools to limit yield losses, however, their widespread use is associated with adverse effects on the environment. Several biotechnological solutions offer promising alternatives to decrease reliance on chemical pesticides by targeting pests and diseases without harming beneficial organisms. However, the safety of such solutions cannot be verified in the EU due to the absence of a regulatory assessment framework. ENSAFE addresses this gap by combining analytical biology, chemistry, computational biology, environmental toxicology, and regulatory science. The project aims to develop tools and a risk assessment framework to evaluate the environmental safety of new plant protection products based on short interfering RNA and natural or designed peptides. ENSAFE will also communicate its findings to relevant stakeholders.

Central  
guidelines

2. **'Evaluating microbiome-based applications for risk quantification: EMBARQ', DKK 59,295,278 over 6 years**

Main applicant: Søren Sørensen, Department. of Biology, University of Copenhagen

Co-applicants:

Eva Møller Nielsen, Department of Bacteria, Parasites, and Fungi, Statens Serum Institute

Carsten Suhr Jacobsen, Department of Environmental Sciences, Aarhus University

Mads Albertsen, Department of Chemistry and Bioscience, Aalborg University

Brief description:

In response to global challenges like climate change, biodiversity loss, and water scarcity, society can benefit from bio-based solutions that enhance environmental sustainability. Using live microbes as biofertilizers, biopesticides, or for bioremediation shows great promise. However, improved risk assessment is needed for these novel biological agents. EMBARQ addresses this by combining environmental tracking of biologicals, DNA sequencing, artificial intelligence, a OneHealth perspective, and risk assessment. The project aims to develop methods and tools to quantify the impact of live microbial agents on agriculture and environmental management, thereby improving the risk assessment framework for industry and regulators. EMBARQ takes a comprehensive approach that will enhance our understanding of soil biodiversity and ecosystem services, targeting farmers, regulators, and the public to ensure alignment with stakeholders and regulatory boards at both national and EU levels.

Carsten Suhr Jacobsen