BASF Biosciences Scouting Needs

Contact: emir.islamovic@basf.com

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Crop Protection / Plant Science:

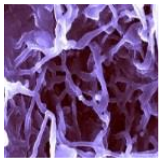
- Technologies for reduction of infections beyond classical chemistry and biologicals
- Technologies for pest and weed control beyond classical chemistries and biologicals
- Technologies to manage fungicide, herbicide, and insecticide resistance
- Biologicals and chemistries for plant health or natural compounds that can be used as seed treatments, in foliar application, and for soil management for pest/disease control
- Traits for fungal resistance, herbicide tolerance, and stress tolerance (e.g. heat and drought)
- Traits to improve crop efficiency in soybean, wheat, canola, and cotton

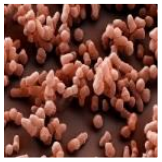
AgIT / In-Field Technologies / Sensors (see also Automation/Robotics):

- Optimized application techniques (e.g. based on weed pattern or disease pressure, precision application, new application timings)
- Precision measurements in field (stationary, aerial, land): soil, moisture, weather, canopy temperature, crop development and maturity (can be crop-specific, e.g. cotton boll counts), seedling vigor, insect-, disease-, herbicide damage, genotypes, and disease markers
- Plant screening in greenhouse or growth chamber: physiology sensors (e.g. for photosynthesis, stomata)
- Greenhouse technologies (digital greenhouse, robotization, sensors, light recipes)
- Cameras: high resolution RGB, stable IR imaging, X-ray CT, multispectral cameras focusing on spectra which have proven physiological interpretation
- Imaging algorithms: learning workflows from image annotation to model building to production, image analysis toolboxes (e.g. for thermal imaging)

Formulation and Delivery:

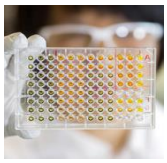
- Novel formulations and delivery technologies for active ingredients (AI) for crop protection: to control AI half life, to allow new application types, or new formulation technologies
- Novel encapsulation methods for AIs, especially completely biodegradable or non-synthetic encapsulant technologies and methods
- Excipients for biologicals – stabilization of proteins, inhibition of aggregation, reduction of viscosity





Microbiology and Fermentation:

- New raw material for fermentation (e.g. gases)
- New chemical products *via* biotechnology (i.e. fermentation, biocatalysis)
- Novel natural antimicrobial agents (excluding classical antibiotics)
- Novel evolution and screening techniques for fungal, yeast, and microbial systems
- Techniques to improve enzyme stability under harsh conditions for biocatalysis
- Sourcing and identification approaches for new biologicals (strains, populations)
- Microbiome research for agriculture and personal care applications
- Compounds to increase fermentation yields



Bioassays:

- Automatization or miniaturization of enzymatic assays; new forms of immunoassays
- Novel approaches to study mode-of-action of both small molecule AIs and proteins
- Tools for protein characterization: e.g. sequencing, 3D structure
- New systems for *in vivo* analysis of metabolites

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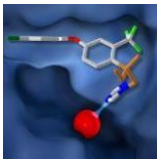

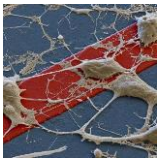

Computational Biology / Automation / Robotics:

- Computer based prediction of enzyme function from sequence data; holistic growth modelling of fermentation hosts
- Automated strain engineering, including *in silico* pathway design
- *In silico* modeling of plant development and behavior at gene, organ, plant, crop, field level
- Methods to physically or computationally separate microbial genomes from background (i.e., plant or human); novel strategies for high throughput metagenomic sequencing.
- Tissue culture workflow automation
- Predictive breeding; computational breeding
- Automation and robotics: controlled watering; smart solutions to bring sensors to plants; seed processing (harvesting, cleaning, sorting, coating, pelleting); seed phenotyping without the need to clean or even harvest the seeds; seed genotyping
- Modeling of protein design
- Machine learning, deep learning, AI
- Automated DNA extraction techniques

Molecular Biology, Cell Biology, and Genetics:

- Targeted ‘chemical’ approaches or other alternative approaches for targeted DSB induction
- All-in-one gene editing particles (SSN & donor template connected)
- Technologies for delivery of various types of biomolecules (DNA, RNA or proteins) into bacterial/fungal/plant cells
- Technologies to transiently express genome editing elements; *in planta* genome editing
- Methods to simultaneously introduce multiple mutations in multiple genes
- Genotype-independent cell and tissue culture methods
- Methods for targeted or increased recombination; generation of promoter deletions
- Approaches to study protein – RNA/DNA interactions, to identify target sequences and/or target transcripts.
- Approaches for robust identification of non-coding regulatory sequences (esp. for crops)
- Technologies to access doubled haploids in recalcitrant species
- Access to apomixis
- New or improved technology to analyze the structure of GM events, stability of the expression, epigenetic status, etc.
- Access to sources of genetic variation (landraces, old cultivars, native traits)

Toxicology:

- Alternative technologies to reduce animal testing
- Computational analysis and artificial intelligence: computer-based prediction of compound binding, uptake, and distribution within animals
- Molecular biology tools: transcription analysis for toxicology interpretation, cell culture systems, and microbiome analysis
- Methods to extrapolate *in vitro* to *in vivo* effects
- Alternative methods to assess developmental and reproductive toxicology