



2024 MTRAC AgBio Innovation Challenge

Summary: The MTRAC AgBio Innovation Challenge (“Challenge”) is a statewide competition designed to match the fitness of Michigan’s emerging technologies to commercial applications in the agriculture, biomaterials, and industrial and environmental (*i.e.* nonmedical) biotechnology industries. Together, these are referred to herein as the “AgBio” industries. The purpose of the Challenge is to catalyze development of new technologies within Michigan’s public universities, nonprofit research institutes and public hospital systems that address important challenges within the rapidly changing AgBio marketplace. It is also intended to encourage Michigan-based innovators to consider the AgBio marketplace as a potentially rapid, high-value path for bringing their innovations to market. The **2024 AgBio Challenge** addresses a subset of opportunities and challenges within the industry as set forth in the following paragraph.

2024 Innovation Challenge Theme: The 2024 AgBio Challenge focuses on innovations that improve value and efficiency in specialty crop or animal protein (e.g., poultry, livestock, seafood, dairy, etc.) production (or food products derived from them) through precision. Qualified innovations are those that employ improved molecular, microbial, genetic, tissue or environmental level detection tools or process strategies to improve the production efficiency or value of food in the target categories. Of particular interest are farm-level concepts that offer an original (and likely feasible) route to improving yield, quality, resilience, nutrient or natural resource efficiency, and/or sustainability of food production in these categories; including those that describe unique detection, sensing, compositional, and genetic/breeding advances, and those that lead to improved decision-making for specialty crop and animal protein production.

Who: The MTRAC AgBio Innovation Hub (Hub) invites researchers at public universities, non-profit research institutes and public hospitals across the state of Michigan to participate in this year’s AgBio Innovation Challenge. To participate, researchers identify novel opportunities to apply an innovative technology concept to meaningful commercial problems/opportunities in the targeted segments of the AgBio industries.

Why: The AgBio Innovation Challenge seeks to make the following awards: Transformation: \$10,000; Innovation: \$7,500; Exploration: \$5000; Activation: \$2,500; Inspiration: \$1,000. Awards are made based on the degree to which the concept papers:

- (i) identify an emerging technology (or technology concept) under development at a qualified Michigan institution with clear applicability to the **2024 Innovation Challenge Theme**;
- (ii) identify one or more specific and novel AgBio applications for the technology and assess the value/significance of those applications within that thematic scope;
- (iii) provide a description of the rationale (why, not how) for using the technology to address the identified AgBio problems;
- (iv) discuss the potential advantage such an application could confer to one or more category of Michigan businesses operating within the thematic area; and

- (v) provide a simple description of the key resources (people, skills, tools, etc.), critical steps and timeline needed to develop an initial prototype to address those applications.

Some or all of the awards may be duplicated or eliminated in any competition cycle, depending on the number and quality of papers received, as well as available funding. Awards are made to the awardee's employer as funds designated for use by the Challenge awardee(s) through their approved university research accounts.

What: The body of the MTRAC Innovation Challenge product concept paper is limited to 3-page single-spaced paper (in 11-12 pt Arial font). The appendix containing references and supporting charts, data, or figures is limited to a total of 3 pages with the same text style requirements as the body. The cover page (see application cover sheet) is not considered part of the page count but is required for a complete submission. The paper must be the original work of the applicant, cover an early-stage technology concept about which the author has some direct knowledge and not simply copy ideas already resident in the literature (or produced via generative AI). Further details of the requirements, scope, and purpose of the MTRAC AgBio Innovation Challenge are summarized below. **Papers are reviewed confidentially** and serve the purpose of helping the AgBio Hub to better understand the risk and opportunity landscape within the current AgBio industry.

The AgBio Innovation Challenge was created to invite Michigan's university-based innovators to identify opportunities to apply their skills within the state's diverse AgBio industries. It is sponsored by the MTRAC AgBio Innovation Hub. The Hub is jointly funded by Michigan State University and the Michigan Strategic Fund (as administered through the Michigan Economic Development Corporation). Important details of the Challenge are described below. More details of the MTRAC AgBio program can be found online at: <https://technologies.msu.edu/researchers/msu-mtrac-agbio>.

AgBio Innovation Challenge Background and Details

Context and Background.

According to a 2019 report from the National Academies of Science ("Science Breakthroughs to Advance Food and Agricultural Research by 2030", 2019) [<https://www.nationalacademies.org/our-work/sciencebreakthroughs-2030-a-strategy-for-food-and-agricultural-research>], the major goals for the next decade of food and agricultural research in the U.S. include: (1) improving the efficiency of food and agricultural systems, (2) increasing the sustainability of agriculture, and (3) increasing the resiliency of crops, irrigation and farming systems to adapt to rapid environmental changes and extreme conditions. These major goals emerge as common themes extracted from the key research challenges identified by food and agricultural scientists. Some of the detailed challenges include:

- Increasing nutrient use efficiency in crop agriculture
- Reducing soil loss/degradation, and encouraging high-efficiency, restorative agriculture, and environmentally beneficial farming practices
- Mobilizing genetic diversity for crop improvement (including yield, quality, resilience, etc.)
- Optimizing water/nutrient use in agriculture (such as by minimizing draw-down, maximizing retention, reducing irrigation needs, increasing delivery precision, active monitoring of soil/plant/animal conditions and improving soil microecology, complexity and organic carbon levels)
- Improving food animal genetics (*e.g.* to improve productivity, increase efficiency of feed conversion and improve human health impact)

- Developing precision livestock production systems (*e.g.* to support herd improvement, nutrition, husbandry/care, quality control, health monitoring, disease control and intervention)
- Early, rapid, precise, and effective detection, prevention and intervention into plant and animal disease
- Early, rapid, and precise detection of foodborne pathogens
- Reducing food loss, waste, and spoilage throughout the supply chain
- Establishing data-based, quality detection and quality assurance features throughout the supply chain (*e.g.*, through certifications, monitoring, digital record keeping and tracking)

Thematic Examples

In most of these innovation categories listed above there are material, device and biological challenges as well as informational ones. For example, many digital applications in agriculture are envisioned as delivering a farm-level benefit by integrating advances in data science, artificial intelligence and machine learning with increasingly precise biological, chemical, and environmental information and monitoring technologies. Often, the objective of such integration is real-time problem (opportunity) identification and response. Within the scope of the **2024 Innovation Challenge Theme** (above), the AgBio Innovation Challenge is a suitable vehicle for exploring solutions that might be developed using novel chemistries, materials, devices, data gathering and/or machine learning strategies.

Other current AgBio challenges that pertain to specialty crop and animal protein include the establishment and maintenance of complex biosystems (*e.g.*, microbial biomes, consortia, etc), bioprocesses and/or ecosystem-level relationships. There are sensing and characterization challenges as well as novel inputs, animal/crop health interventions and yield/quality improvement strategies, and many other types of challenges. Whether they relate to activities in soil, plants, water sheds or fermentation/bioreactor vessels, they may be suitable for submission of an AgBio Innovation Challenge concept paper within the scope of the 2024 Challenge. These are just a few of the many emerging themes that qualify for the MTRAC Innovation Challenge.

There is an increasing recognition that the U.S. food and materials production systems need to engage researchers and technical experts whose work is not traditionally focused on agricultural or environmental sciences. One objective of the MTRAC Innovation Challenge is to encourage the building of effective conversations and collaborations between AgBio researchers and other disciplines. Another is to encourage Michigan innovators to familiarize themselves with the state's diverse and productive AgBio economy and find opportunities to catalyze its advancement.

Unlike a grant proposal, the entrants in the MTRAC AgBio Innovation Challenge are not competing to fund their existing research agenda, but for recognition and cash research prizes related to the unique concepts that address the Theme of the Challenge. Ideally, the researchers will use the awards to further develop or test their concepts. (That is not a requirement for receiving an award.) Top-scoring papers will be those that point the way to areas of convergence between multiple technical disciplines and clear market opportunities for Michigan researchers and businesses in the thematic categories described above.

Competition Guidelines.

The MTRAC Innovation Challenge is an interdisciplinary opportunity identification and risk assessment competition. In it, competitors identify critical needs (*i.e.* opportunities) in the agriculture, biomaterials and industrial biotechnology industries and then develop a conceptual, interdisciplinary bridge

establishing the applicability of one or more emerging technology to the identified market need. (Please see the details of the current Challenge Theme for limitations on this scope.) High scoring concept papers will be those in which the researchers identify a clear market application for an emerging proprietary technology (such as a tool, device, process, AI system, material or chemistry) that is owned or in development at a MI public university, public hospital or non-profit research institute. Preferably, this will be a technology with which the applicant is already deeply knowledgeable. Sometimes, the applications will involve combining multiple technologies. The technologies needed to enable the novel application(s) are referred to in this document as “Emerging Technology(ies)”. Strong proposals will provide enough detail to establish a strong conceptual bridge between the identified Emerging Technology and the specific needs and market applications identified. They will also provide some evidence that real businesses or end users have a need to solve the problem identified. Establishing this bridge between the technologies, the market problem and the skillsets and technical capabilities required to develop the application is the focus of the Challenge. A complete response will further assess the level of progress that may be achieved in the next 18-24 months with an appropriately structured translational research team (*e.g.* Can a prototype be developed in 6, 12, 18 mo? What field testing is required? What range of capabilities can be explored? etc.).

In sum, the Innovation Challenge concept paper should not describe how the technology application will be built/achieved, but rather what Emerging Technology would be employed, why the Emerging Technology is likely suitable for meeting the key requirements of a solution, how the application would be valuable in the AgBio market, who would benefit from it and how much time/cost would be required for a skilled team to build an effective field prototype.

Proposals will be reviewed and scored as risk assessment studies by the MTRAC AgBio leadership group. Reasonable efforts will be used to keep concept ideas confidential for a period of one year. While the proposals should not intentionally reveal critical details needed for potential patent filings, proposals that appear to contain such detail or other meaningful intellectual property may be referred to the designated technology manager listed on the cover sheet of the application. Participation in the Challenge indicates that the applicant(s) and their collaborators agree to allow the MTRAC program, MSU and MEDC (together with their affiliated organizations, agents and representatives) to release participant names, product concept titles and a brief (~1-2 sentence) concept summary. Typically, these releases are done as part of their ongoing reporting, press releases, progress reports, announcements and required filings.

High Scoring Concept Papers will be those that:

1. Describe a practical problem in an AgBio related industry that the researcher(s) believe can be addressed by one or more Emerging Technology; and for which they make a compelling case in terms of the value and impact of solving the problem.
2. Identify the Emerging Technology and communicate a clear conceptual argument (*i.e.* ‘bridge’) that establishes the applicability of the technology to solving the problem.
3. Accurately identify the audience that has the problem, the beneficiaries of solving the problem and the potential value of doing so (in monetary terms and, potentially, other metrics).
4. Demonstrate the potential to involve one or more researchers from outside the submitter’s core discipline and demonstrate a clear understanding of the market problem being addressed, preferably with evidence of meaningful contact with one or more commercial entities or end-users who can validate the importance of the problem (and need for a solution).

5. Provide a clear summary of the type of team (*i.e.* the disciplines and skills needed) and potential time and funding and critical steps likely to be necessary to test ideas and develop an initial prototype.
6. Provide strong evidence of interdisciplinary engagement, an understanding of end-user performance requirements and a clear indication of the level of interest the submitter(s) has in working on development of technologies similar to the one described in their submission.
7. Support the concepts presented in items #1-6 with relevant references, data, examples, and illustrations, as part of the appendix.
8. Address the relevance of the problem and solution to one or more categories of Michigan-based AgBio businesses.

Product Concept Submissions.

The body of the MTRAC Innovation Challenge product concept paper is limited to a 3-page single-spaced paper (in 11-12 pt Arial font; 1 inch margins). The appendix, containing references and supporting figures, charts and/or illustrations (if needed) is limited to a total of 3 pages with same text style requirements. The cover page (see application cover sheet) is not considered part of the page count but is required for a complete submission. The document should identify the submitter(s) of the idea and their public university, hospital or non-profit research institute affiliation and role, the technology transfer manager or licensing contact that would serve as the contact for any intellectual property related concerns. The ideas submitted under the Innovation Challenge should be original (in terms of their AgBio applications) and not be the subject of any current translational research funding awards to the submitters or their collaborators. They should be original, exploratory concepts that do not fall into an already well-established category of AgBio technology or practice.

Awardees will be instructed to provide an institution level invoice to the MTRAC program in the amount of the award for which their submission has qualified. The invoice should identify the institutional account to which research or professional development funds will be deposited. (Note: The MTRAC AgBio Innovation Hub may work with the institution to verify the suitability of the account for receipt of MTRAC funds.) Proposals describing highly promising product or technology concepts may be invited to apply for subsequent MTRAC Starter or Full grants that address the concept.

Award Decisions and Exclusions.

Researchers may submit no more than one paper per cycle of the Innovation Challenge. Researchers whose technologies or ideas have received an Innovation Challenge award or MTRAC translational research grant funding (Starter or Full) in the two years prior to the Innovation Challenge submission deadline are not eligible for awards under that cycle of the Innovation Challenge.

While a target number of awards and award sizes (generally, \$1,000 to \$10,000) are established for each Innovation Challenge cycle, the MTRAC program reserves the right to award some, none or all the awards listed (*i.e.* based on available funding, proposal numbers and quality).

The Challenge is intended to provide the MTRAC leadership team with an influx of ideas and concepts that may qualify as subjects for future translational research and commercialization grants. As such, the selection committee shall be comprised of no fewer than 3 individuals with strong familiarity with the AgBio MTRAC program and considerable experience in technology development, licensing and/or commercialization. Award decisions made by the committee are final.

Award Form and Distribution.

The papers submitted under the MTRAC Innovation Challenge are considered market/risk assessment and technology feasibility reports under the MTRAC program. The intent is that they provide strong programmatic ideas, insight, and guidance to those managing the program. Award funds will be made to the applicants listed on the cover page as unrestricted research funds paid to their institutions in their names for assignment to approved individual research accounts.

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