

## **FY21 Federal Research Funding Overview**

Iowa State University received \$154.8 million in federal research funding in FY21, which is \$31.2 million, or 16.8%, below the FY20 record of \$186 million.

A key factor that skewed Iowa State's federal funding lower in FY21 is that Ames Laboratory has not yet received \$25 million the Department of Energy (DOE) allocated for the Critical Materials Institute (CMI) for the federal fiscal year, which runs through the end of September. The \$25 million for CMI would increase Iowa State's federal funding level for FY21 to \$179.8 million – the midpoint of federal funding Iowa State has received in the past five years.

Iowa State experienced notable increases in Department of Defense (DOD) and Department of Transportation (DOT) funding in FY21, and the funding received from Health and Human Services (HHS) and the various agencies of the National Institutes of Health (NIH) established a new record. The \$8.8 million in DOD funding was \$3.8 million, or 75.2%, over FY20, while the \$9.2 million in DOT funding was \$4.8 million, or 108.9% over the amount received in FY20. The \$18.7 million in HHS/NIH funding slightly surpassed the previous high of \$18.6 million established in FY19.

### **U.S. Department of Defense**

Here are just a couple of the notable projects that received DOD funding at Iowa State in FY21:

- Rizia Bardhan, associate professor of Chemical and Biological Engineering, [received an award of \\$586,553](#) from DOD's Army Medical Research Acquisition Activity (USAMRAA) to explore the use of 3D culture systems and high-throughput Raman spectroscopy screening to enhance individualized treatment for colorectal cancer (CRC) patients. Bardhan is collaborating on this project with: [Jonathan Mochele](#), associate professor of Biomedical Sciences in Iowa State's College of Veterinary Medicine; Soumik Sarkar, ISU associate professor of Mechanical Engineering; and Bhuminder Singh at Vanderbilt University School of Medicine.
- Gregory Phillips, professor of Veterinary Microbiology and Preventive Medicine, is leading a team that is using innovative artificial intelligence to study how to improve the effectiveness of vaccines by gaining a better understanding of how the microbiome interacts with the human immune system. [Phillips received an initial award of \\$551,032](#) from the Defense Threat Reduction Agency (DTRA) in FY21. The overall project includes two additional option years with an estimated total award of just over \$1.6 million.

### **U.S. Department of Transportation**

Notable projects receiving DOT research funding in FY21 included:

- The internationally recognized National Concrete Pavement Technology Center, led by its director, Peter Taylor, received a \$6.5 million award from the Federal Aviation Administration (FAA). The purpose of the grant is to support the ongoing work of Iowa State's CP Tech Center and the FAA to discover and advance 21<sup>st</sup> century solutions for concrete pavement design, construction and materials to optimize airfield reliability, efficiency and safety.

- Halil Ceylan, Civil, Construction and Environmental Engineering professor, received an award of \$619,267 from the FAA to explore the use of small Unmanned Aircraft Systems (sUAS), or aerial drones, in airport pavement management programs (PMP). Ceylan's research will provide airport operators standard processes and procedures, as well as recommended content for minimum technical specifications for various types of sUAS and sUAS-mounted sensor technologies, to consistently conduct safe, reliable and effective sUAS airport PMP inspections.

### Health and Human Services/National Institutes of Health

Here are just a few examples of new research projects receiving HHS/NIH funding during the 2021 fiscal year:

- Andy King, assistant professor in Iowa State's Greenlee School of Journalism, received an [initial grant of \\$396,908](#) from the NIH National Cancer Institute (NCI) for a four-year project that is estimated to receive more than \$1.5 million in total funding. Both incidence and death rates due to colorectal cancer (CRC) are disproportionately higher among Black Americans, compared to non-Hispanic White Americans. King is leading a multi-institution team that is studying communication related to colorectal cancer screening (CRCS). The ultimate goal is to identify messages and information that are most effective in supporting adherence to CRCS recommendations and ultimately improve screening acceptance and behaviors in at-risk communities.
- Marian Kohut of the Department of Kinesiology and the [Nanovaccine Institute](#) and Balaji Narasimhan of the Department of Chemical and Biological Engineering and the Nanovaccine Institute received \$729,805 for the first year of a five-year project with an estimated total award of more than \$3.5 million. In an initiative that aligns with the state's Biosciences platform priorities, the Kohut- and Narasimhan-led team will explore the development of a nanovaccine that incorporates safe biomaterials and adjuvants to lessen the mortality and hospitalizations caused by the Influenza A virus in adults over the age of 65.
- [Jonathan Claussen and Carmen Gomes](#), both associate professors of Mechanical Engineering, received a one-year grant of \$664,521 from HHS and the Centers for Disease Control and Prevention (CDC) to develop better, cheaper, quicker, more accessible testing for the coronavirus that causes COVID-19. The project, which started with a \$15,000 seed grant from the Iowa State Office of the Vice President for Research, focuses on developing a saliva test similar to test strips used to monitor glucose levels in people with diabetes. The tests could be easily done at home, workplaces or a doctor's office with no expensive lab equipment. Results would be available in about 20 minutes, and the cost of the test is expected to be less than \$6.

### National Science Foundation

Year in and year out, NSF is one of the top three federal funding agencies sponsoring research at Iowa State. NSF funding over the past five years has consistently been in the \$30 million to \$35 million range. This year's total of \$30.2 million is \$1.5 million, or 4.6%, below last year's \$31.7 million, and the lowest amount over the past five fiscal years. Here are a few new notable projects that received NSF funding in FY21:

- Soumik Sarkar, associate professor of Mechanical Engineering and a Walter W. Wilson Fellow in Engineering, received an initial FY21 award of \$1.9 million from NSF and USDA-NIFA on a five-year \$7 million Cyber-Physical Systems (CPS) Frontier grant. Sarkar is leading a multi-institution, interdisciplinary research initiative that could bring unprecedented levels of efficiency and sustainability to production agriculture. The team is focused on transforming current cyber-

physical systems and capabilities in agriculture by developing a novel, context-aware cyber-agricultural system that encompasses sensing, modeling, and actuation activities to enable farmers to respond to crop stressors more cost-effectively, with greater agility and with less impact on the environment than current practices.

- Many small and rural communities across Iowa and throughout the U.S. are shrinking, and evidence shows this a trend that is unlikely to be reversed in most instances. Kimberly Zarecor, professor of Architecture in the College of Design, received an NSF award of \$1.5 million to spearhead a project that encourages communities to adapt to shrinkage rather than fight against it, with the goal of helping them mitigate the negative effects of population loss on quality of life and community services. Zarecor's multidisciplinary team will develop and test new educational resources and data-driven tools to help rural Iowa communities implement effective strategies for smart shrinkage.
- Evgeny Chukharev-Hudilainen, associate professor of Applied Linguistics and Technology, received an award of \$750,000 to develop an automated intelligent tutoring system that provides students with real-time assessments and feedback to strengthen and enhance their written communication skills.
- Asheesh Singh, Agronomy professor and Bayer Chair in Soybean Breeding, received nearly \$1.5 million to develop technology that will enable farmers to pool data and share knowledge to guide responses to production challenges such as weeds, disease and pests. Singh will lead a multidisciplinary research team that will pair innovative data gathering methods with machine learning to make information easily accessible to farmers in the program.

### **U.S. Department of Agriculture**

The research funding USDA provided in FY20 was truly unprecedented for Iowa State – the \$47.8 million was more than double the \$23.6 million received in FY19. Last year's funding total was elevated by an award of \$10 million for the [Consortium for Cultivating Human and Naturally reGenerative Enterprises \(C-CHANGE\)](#), and three additional individual awards of \$2 million or more. The \$30.1 million in funding Iowa State received from USDA in FY21 is more representative and typical of the level of support the university has received from the agency in the past five fiscal years. Here are some notable new research projects that received USDA funding during the 2021 fiscal year:

- Thomas Lübberstedt, professor and K.J. Frey Chair in Agronomy, received an award of \$1.4 million from USDA-NIFA, to spearhead a multi-institution, interdisciplinary initiative to develop new and improved seed varieties for organic production of sweet corn and specialty corn, primarily. The long-term objective is to improve the quality, value and profitability of organic corn by developing new breeding methods that allow new varieties to be produced more efficiently. Lübberstedt and his team have structured the project so that organic farmers will be full partners, assisting scientists in evaluating sweet and specialty corn lines for productivity under organic conditions.
- Adina Howe, assistant professor in Agricultural and Biosystems Engineering, [received a \\$1 million award from USDA-NIFA](#) to explore the connection between livestock manure management and antimicrobial resistance (AMR). The majority of antibiotics in use today are used in animal production. Antibiotic-resistant bacteria can end up in manure, and can make their way into the environment when manure is applied to fields as fertilizer. Howe and her fellow researchers aim to figure out what resistant genes proliferate in bacteria and how widely those bacteria spread and persist in the soil.

- Wenzhen Li, associate professor and Herbert L. Stiles Faculty Fellow in Chemical and Biological Engineering, received \$450,000 from USDA-NIFA's Agriculture and Food Research Initiative (AFRI). Li is working with co-PI, Mark Mba-Wright, to design an unprecedented paired-flow electrolyzer that can efficiently convert furfural and glycerol, as well as another key agricultural waste product – carbon dioxide – into higher-value chemicals. The project offers the potential to improve agricultural sustainability and enhance economic growth in Iowa and throughout the Midwest by engineering improved products from agricultural wastes. The work also offers the potential to engage with a broad range of stake holders beyond agriculture, including fuel and chemical producers, electrical utilities, biogas plants, wind energy interests and policy makers at both the state and national levels.