

Applied Evolution Seed Grants

Request for Proposals

The College of Agricultural Sciences (CAS) Office for Research and Graduate Education, in partnership with the Huck Institutes of the Life Sciences, invites proposals investigating challenges that can be addressed through *applied evolution*. **All topics under applied evolution as explained below will be carefully considered.** In this cycle, priority will be given to projects more specifically addressing evolutionary *resistance*. Interdisciplinary teams across the university system are strongly encouraged to submit a proposal.

Proposals with budgets up to \$30,000 for one year will be considered. Requests for a second-year renewal will be considered but are contingent upon adequate progress in achieving year one goals and clearly defined year two objectives. Awards may range in amounts to support activities for team development and/or the generation of preliminary data around a clearly defined research problem.

What is Applied Evolution?

Over the course of the current pandemic the emergence of new SARS-CoV-2 variants, especially the more recent strains with increasing resistance to antibody detection, underscores the pressing need to better understand evolutionary processes more generally. The COVID pandemic, though our most immediate and dangerous threat, is just one of many evolutionary challenges facing society.

A changing climate and land-use patterns across the globe, increasing selective pressures associated with drug and pesticide use as well as biological invasions, are all significant factors in driving mismatches between animal and plant phenotypes and their environments. The impacts of these evolutionary drivers can result in increased animal and human disease, reduced yields of food and fiber and/or increasing loss of biodiversity. The need to feed and shelter a growing population brings with it the necessity to control insects, weeds, and plant pathogens that are a threat to increased productivity and food security. Diseases of both animals and humans as well as the vectors that transmit them result in loss of livestock production and increased incidence of human disease. The ability of individuals within a population to overcome detrimental stressors and survive and reproduce demonstrates the power of evolutionary survival and is exemplified by the ability of pathogens and pests to counter-adapt and propagate. For instance, vaccines may lose their efficacy as a virus mutates; mosquitos may evolve resistance to insecticides; unwanted insect pests, plant diseases, or weeds may overcome the potency of pesticides; an infectious bacteria may develop resistance to antibiotics; or cancer cells may develop a resistance to drug therapies.

Applied evolution research involves investigations into how and why organisms adapt and counter-adapt through evolutionary processes. In better understanding the mechanisms of these evolutionary responses and counter-adaptations, this research has the potential to identify management approaches to provide sustainable solutions to some of the most pressing issues regarding resistance to pesticides, antibiotics, chemotherapeutics and to better predict the consequences and responses to disruptive ecological events such as climate change and biological invasion.

Penn State and CAS research expertise across evolutionary biology, infectious diseases, cancer, ecology, herbicide, insecticide and fungicide resistance, as well as the range of complementary expertise among our colleagues across the university, uniquely positions Penn State to be a leader in evolutionary risk assessment and management.

Eligibility

1. The Primary Investigator (PI) must be a faculty member with a research appointment (tenured, tenure-track, or non-tenure-track) from any unit within the Penn State system. Proposals that do not include CAS faculty are eligible and will be considered with support from the Huck Institutes for the Life Sciences. Proposals led by CAS faculty with collaborators from other units may also seek support from Huck.
 - a. Individuals can only be the PI on one proposal but may serve as a co-PI on multiple proposals.
2. Projects must seek to address a critical research need and opportunity pertaining to applied evolution that is beyond the scope of a single laboratory or investigator's focused area of research. All proposed research projects must require the participation of interdisciplinary collaborators with complementary fields of expertise. Ideas for multidisciplinary topics are encouraged and will be given preference.
3. For team development-focused grants, a plan for engaging multiple departments or disciplines is required, but all team participants do not have to be identified in the proposal.

Application Process

Full proposals must be submitted as a unified PDF by **April 30, 2022**, using the online submission form: <https://psu.infoready4.com/#competitionDetail/1861943>

All proposals will be routed through the vice/associate dean for research of the participating colleges or campuses for acknowledgement of the proposal (no financial commitment is required). Applicants outside of CAS are encouraged to discuss this component with their unit's research office in advance of the full proposal submission deadline.

The InfoReady form requires choosing which of the following best describes your team and the nature of your expected expenditures (listed here as reference):

- A. College of Agricultural Sciences (CAS) team
 - a. All collaborators on the proposal have appointments within CAS
 - b. All personnel costs are within CAS
- B. Lead in CAS with team members from any unit
 - a. PI has appointment within CAS
 - b. Funds are necessary for supporting non-CAS personnel or other expenditures in another college or Penn State campus
- C. Lead in other Penn State unit with team members from any unit
 - a. PI and collaborators may have appointments in any unit(s) within the Penn State system

Please adhere to the proposal requirements outlined below. Contact Gretta Tritch Roman (gst118@psu.edu), Research Initiatives Associate, for assistance with the development of proposals and questions related to this solicitation.

Proposal Requirements

The full proposal must include all following components in a unified pdf and adhere to the page limits listed below.

- A. Proposal Narrative** (3 pages maximum)
 - a. Description of the research problem, including the expected significance of the work if continued beyond the timespan of this seed grant
 - b. Outline of the objectives, including a brief description of the activities that support the pursuit of these objectives, anticipated outcomes of doing the work, and clear benchmarks for achieving these outcomes
 - c. If focusing on team development, include a strategy for targeting specific expertise that will be needed to pursue the stated research problem
- B. Project Team** (1 page maximum)
 - a. Faculty from any college at Penn State may be included as participants (be sure to note the budget requirements outlined below).
 - b. List all team members with their departmental affiliations and describe the role and responsibilities of each project team member, including how the expertise of each is required to address the proposed research problem.
 - c. Include a list of targeted collaborators or expertise to fill anticipated gaps (if applicable)
- C. Budget and Justification** (2 page maximum)
 - a. Budget in tabular format with lines for the budget sections listed below and a line indicating the **total amount requested**. Provide a written justification (can be separate from the table) that includes a brief description and explanation of need for costs associated with the activities in this proposal. Use the following budget sections as a guide:
 - i. *Personnel* (Fringe benefits ARE REQUIRED in personnel costs.)
 - ii. *Travel* (for invited guests)
 - iii. *Meeting expenses and meals*
 - iv. *Honoraria* (Honorarium payments are limited by the University to \$1,000 or less. If payment to a visiting faculty member or other individual for speaking will exceed \$1,000, payment can still be made, but must be identified as a Personal/Professional Service, and the [University Scholar Agreement](#) must be completed.)
 - v. *Purchased Services* (e.g., AV for conferences, analysis of samples, core facilities fees, etc.)
 - b. For CAS participants only: requests for GIA support (i.e., tuition per semester) for graduate students included in the proposed budget will be considered with sufficient justification that the project enhances the student's education. Eligible students must be registered full time in a CAS or CAS-affiliated graduate program and mentored by CAS faculty. The GIA support would be in addition to the \$30,000 maximum. This request must be noted in the budget table and justification.
 - c. These funds **cannot** be used for:
 - i. Faculty salaries (including supplemental) or standing appointment salaries
 - ii. Travel to professional meetings
 - iii. The purchase of equipment
 - d. All other project costs typically allowed by federal extramural sponsors are allowed in this program.

- e. Budgets can be constructed for a **maximum of 1 year**, with the period of performance being July 1, 2022, through June 30, 2023.
- f. Note that submissions to this internal competition do not require the budget to be created through the College's Grants and Contracts Office (this pertains to all applicants but is specifically noted for CAS applicants).

Proposal Review Process

- Proposals will be evaluated by a review panel who will make funding recommendations to the CAS Associate Dean for Research and Graduate Education and/or the Director of the Huck Institutes the Life Sciences as appropriate.
- Proposals focusing on evolutionary resistance may be prioritized for funding, but all topics under applied evolution will be given careful consideration.
- Preference will be given to multidisciplinary teams.

Evaluation Criteria

- Presents an innovative approach to a clear and well-defined research problem.
- Proposed research is transformative, requiring multidisciplinary collaboration, more than incremental.
- Identifies team members with the expertise required to address the proposed research problem or has identified missing expertise with a realistic plan to fill that gap.
- Proposes a realistic timeline of activities and includes adequate benchmarks for gauging progress in achieving the research goals within the one-year performance period.
- Should address problems with large impacts on human welfare and/or reduced economic or environmental losses.

Reporting

Awardees will be asked to give a preliminary presentation on the proposed project at a symposium planned for Summer 2022. The symposium will be an opportunity to solicit collaborations and get early-stage feedback from colleagues.

A written report will be due one year after the award. Guidance on report requirements will be provided. At the conclusion of the one-year performance period, the Office for Research and Graduate Education and Huck Institutes will plan a workshop with all awardees to plan next steps in pursuit of sustained funding. Requests to renew projects for a second year of funding will be reviewed on a competitive basis.