



## TURFGRASS AND ENVIRONMENTAL RESEARCH PROGRAM

# 2021 CALL FOR PROPOSALS

### PURPOSE

The USGA Turfgrass and Environmental Research Program develops and supports non-biased research for a healthier environment, community, and playing conditions for the game of golf. Research that advances scientific knowledge or provides agronomic, economic, or environmental solutions to golf's stakeholders will be considered. Proposals will be prioritized based on the following strategic initiatives and the specific list of research priorities and considerations on the last two pages of this call.

### STRATEGIC INITIATIVES

1. Optimize sustainable golf course management and playing conditions.
2. Protect and conserve water resources.
3. Identify and develop novel plant materials.

#### *1. Optimize Sustainable Golf Course Management and Playing Conditions*

**Description:** *Create environmentally sound golf course agronomic programs that enhance golfer experience and protect the environment. Specifically, proposed research should:*

- a. Develop technologies and management strategies that improve resource efficiency and mitigate stress.
- b. Optimize maintenance efficiency by reducing golf course disruption and reliance on resources.
- c. Quantify the ecosystem services and disservices provided by golf courses.

#### *2. Protect and Conserve Water Resources*

**Description:** *Deliver optimal course conditions while protecting and conserving water resources with new strategies and technologies. Specifically, proposed research should:*

- a. Quantify water savings and the return on investment from the combination of new technologies, cultivars, and management strategies.
- b. Develop novel management programs and tools to mitigate the stresses of poor-quality irrigation water.
- c. Develop best management practices to protect surface and ground water quality.

#### *3. Identify and Develop Novel Plant Materials*

**Description:** *Develop novel plant materials for golf courses. Specifically, proposed research should:*

- a. Identify and improve low-maintenance plant materials for major climatic regions.
- b. Deliver cultivars that optimize region-specific growing conditions and mitigate stresses for all playing surfaces.
- c. Foster the development of best management practices and technologies for rapid and successful establishment of improved plants.



## GUIDELINES FOR FUNDING RESEARCH PROJECTS

Submit one copy of the full proposal to [cthompson@usga.org](mailto:cthompson@usga.org) by **Friday, June 25, 2021**. *Proposals that do not meet the following guidelines will not be considered.*

### *Research Proposal Format and Timetable*

**Page 1:** Use the accompanying 'Executive Summary' form to provide a one-page summary of the full proposal. Projects that document measurable implementation of results for economic, environmental, or playability benefits will be given a higher priority. Address the following:

- **Project Description.** Introduce the research problem, rationale for the research, and a summary of the research objectives for the proposal.
- **How Our Proposal is Different.** Explain how the research differs from previous work.
- **Potential Benefits for the Golf Industry.** Summarize the scientific knowledge the research will produce and how you think results will affect golf course management. Identify the target audience and explain how the research could be implemented to produce *measurable* economic, environmental, or playability benefits.
- **Deliverables.** Specify measurable deliverables for how research results will affect the previously listed strategic initiatives and improve the golf industry. Examples include improved sustainability or management techniques, decision-support tools, peer-reviewed journal articles, trade magazine articles, other educational materials, plant varieties, improved germplasm, interesting genes, etc.
- **Budget Summary.** Complete the annual funding request and the total amount for the research project. Note specific requirements in the 'Funding Guidelines' section below.

**Pages 2 through 6:** Format up to five pages with one-inch margins **and minimum font size of 10 points**. Include the following:

- A description of the research question and scope of the problem, including a literature cited section for relevant previous research.
- The objectives of the project, research methodology, available research and field facilities, reasonably expected results by the end of the project, and a brief timeline.
- A table that contains the project budget. Note specific requirements in the 'Funding Guidelines' section below.
- A brief, one-paragraph biographical description of the principal investigator and cooperating researchers.

### *Funding Guidelines*

Proposals will be prioritized for funding based on the potential to affect the previously listed strategic initiatives and the validity of methodology. Any level of funding may be requested for one to three years, but the project budget must clearly justify requested funding.

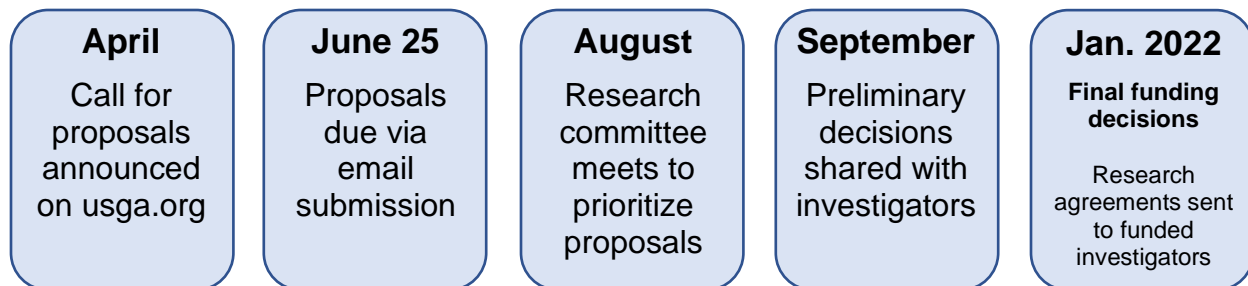
The USGA typically allocates \$1.7 million annually to support approximately 65 ongoing and new projects. **Approximately \$400,000 per year is budgeted to support new projects from this call in 2022, 2023, and 2024** (i.e., \$1.2 million over the next three years).



#### USGA funding:

- May be used for graduate student research support, graduate student tuition, technician salaries, and other labor costs.
- **Shall not** be used for capital expenditures, construction costs, or faculty salaries.
- **Will not support** overhead or administrative costs exceeding 16% of total direct costs. Indirect costs for collaborative projects over multiple institutions should be calculated separately in the budget and not exceed 16% of the annual budget for each institution.
- **Will not support** overhead or administrative costs for grants of \$10,000 per year or less. The USGA is a not-for-profit, [501(c) 3] association and is vitally interested in providing the maximum direct support to research from available funds.

All investigators will be updated about proposals in September. This initial decision will notify the authors of unsuccessful proposals and indicate to others when a final decision is expected for their proposal. **Final funding decisions likely will not be communicated until January 2022** (Figure 1). Agreements for approved projects will be written for one to three years; however, a continuation of the project shall be determined annually, and written notice shall be given. The decision to continue will be subject to performance and progress toward meeting the stated project objectives. After a signed agreement is completed, funding will begin in the project year of January 1, 2022 through December 31, 2022.



**Figure 1.** Timeline for the 2021 call for proposals. **NOTE:** Should funding announcements be delayed for any reason, you will be notified in September 2021 and updated regularly until funding is announced.

#### *Proprietary Rights*

USGA policy is that all technology, inventions, and writings developed or first made in the performance of the research project and any patents, plant variety protection, and copyrights therein shall become the property of the university. However, the USGA, in effect, shall have the right of first refusal if the university elects not to file a patent or plant variety protection application on any invention conceived or reduced to practice during the research project. It is the policy that the USGA receives up to 50% of all royalties (less patenting and licensing costs) or the monetary equivalent of any other consideration received by the university or the USGA from the sale, licensing, or sub-licensing of proprietary rights. All royalties received by the USGA shall be deposited in the USGA Foundation for the perpetuation of turfgrass and environmental research.

#### *Reporting Requirements*

The following reports and articles are due by the dates indicated. Failure to fulfill reporting requirements will result in the withholding of funding.



1. **An annual report is due by December 1<sup>st</sup> of each project year.** Annual reports should be two to three pages and describe in reasonable detail the research initiated, progress, and results to date. The information in this report will be used in the USGA's "Turfgrass and Environmental Research Summary" published each year on the USGA website. All reports also will be available online as part of the Turfgrass Information File.
2. **A final report is due at the conclusion of the project.** The final report should summarize the entire project, include examples of how results will be implemented, and estimate the potential economic impact of the research on the golf course industry. Final reports will be published on a USGA website. If a graduate student thesis or dissertation is a result of the funded research, a copy must be submitted to the Turfgrass Information Center at Michigan State University.

At the conclusion of the project, a manuscript must be submitted to a scientific journal for peer-review and consideration for publication. A copy of this manuscript also should be sent to [cthompson@usga.org](mailto:cthompson@usga.org). If accepted, **the USGA requires investigators to pay the necessary fees for the article to be open access.**

**The USGA has the first right of refusal to trade articles published on USGA-funded research.** During the research project or at the conclusion of the project, at least one article for the *Green Section Record* or an acceptable trade magazine is required.

### *Contact Information*

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## SPECIFIC RESEARCH PRIORITIES

This list of research priorities was developed by the research committee to identify critical knowledge gaps to help investigators refine proposals. The list is not comprehensive, nor is it intended to replace the previously listed strategic initiatives. Rather, the list provides examples of crucial research subjects that could guide the development of specific hypotheses.

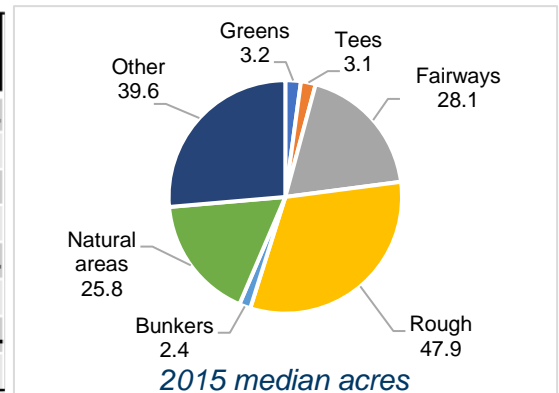
**Table 1.** Examples of specific research priorities developed by the research committee.

<b>Topic</b>	<b>Description</b>
Improve the adoption of resource-efficient cultivars	Demonstrate compelling reasons to adopt (or not to adopt) new turfgrass cultivars. Potential projects could seek to define the traits consumers most desire or to improve establishment strategies to ensure a successful renovation to a resource-efficient cultivar over a shorter timeframe.
Novel technologies	Develop and demonstrate the benefits of novel technologies (e.g., automation, machine learning, sensors and sensor networks, etc.)
Turfgrass persistence under drought	Intensively evaluate turfgrass durability under various soil water potentials (and with other interacting environmental stresses) for all playing surfaces.
Bicarbonates in irrigation water	Demonstrate the legitimacy of concerns for bicarbonate-laden irrigation water and the efficacy of mitigation products in i) non-sodic or ii) sodic regions.
Microbiome	Advance understanding for turfgrass management including census, effects of management, and detailed and correct explorations of products such as microbial teas and inoculants.
Clarifying the turfgrass literature	Meta-analyses or reviews of literature for important topics: Summarize and clarify existing literature to advance knowledge in key areas (e.g., environmental services and disservices of turfgrass and golf courses).

## IMPORTANT CHARACTERISTICS OF U.S. GOLF COURSES

The following are characteristics of U.S. golf courses that further influence research priorities. When defining opportunities for resource efficiency or improved golfer experience, investigators should consider the footprint and relative budget share of golf course features (Figure 2) and the reach of proposed research on regional and national scales (Table 2).

Greens	Tees	Fairways	Rough	Bunkers	Natural areas	Other	Total facility
----- median acres -----							
3.2	3.1	28.1	47.9	2.4	25.8	39.6	150.0
----- % of facility -----							
2.1	2.0	18.7	31.9	1.6	17.2	26.4	100.0
----- % of major playing surfaces budget -----							
53.8	6.2	6.8	1.4	31.8	-	-	-
----- % major surfaces budget : % of facility ratio -----							
25.07	3.03	0.36	0.04	20.23	-	-	-



**Figure 2.** The median acres and corresponding budget shares for playing surfaces of 18-hole golf courses in the U.S. in 2015. **Median-acre data source:** Gelernter et al. 2017. *Documenting Trends in Land-Use Characteristics and Environmental Stewardship Programs on US Golf Courses*. Crop Forage Turfgrass Manage. Volume 3. doi:[10.2134/cftm2016.10.0066](https://doi.org/10.2134/cftm2016.10.0066). **Budget-data source:** USGA and R&A. 2019. *Distance Insights Report*. [Distance Insights Library](https://www.usga.org/insights). usga.org.

**Table 2.** Percent of projected total acres of turfgrass species on U.S. golf courses in 2015.

	Annual bluegrass	Creeping bentgrass	Fine fescue	Kentucky bluegrass	Perennial ryegrass	Tall fescue	Bermuda	Zoysia	Seashore paspalum	Other
----- % of projected total golf turf acres within regions (rows) -----										
North Central	15	15	4	50	12	3	0	0	0	1
Northeast	20	20	5	28	19	7	0	0	0	0
Pacific	44	6	4	5	33	1	5	0	0	3
Southeast	0	1	0	0	0	1	91	1	3	3
Southwest	5	2	0	4	9	2	65	1	3	9
Transition	4	8	1	8	4	20	46	8	0	1
Upper West/Mountain	16	6	2	49	21	1	4	0	0	1
----- % of projected total golf turf acres in the U.S. -----										
United States	11	9	2	23	10	6	34	2	1	2

<sup>1</sup>Projected-acre data were used to calculate proportions of each turf species within regions and for U.S. totals. **Data source:** Gelernter et al. 2017. *Documenting Trends in Land-Use Characteristics and Environmental Stewardship Programs on US Golf Courses*. Crop Forage Turfgrass Manage. Volume 3. doi:[10.2134/cftm2016.10.0066](https://doi.org/10.2134/cftm2016.10.0066).

<sup>2</sup>Within columns, green fill indicates species that represent a larger proportion of a geographic region than in total U.S. acreage.