AG2PI

Agricultural Genome to Phenome Initiative

Patrick Schnable, Ph.D.

Government-University-Industry Research Roundtable

July 20, 2021

Agricultural Genome to Phenome Initiative (AG2PI) is funded by USDA-NIFA awards 2020-70412-32615 and 2021-70412-35233

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AG2PI: Creating a Shared Vision Across Crop & Livestock Communities

Overall Goal: to assemble a cross-kingdom, transdisciplinary community and prepare this community for an anticipated large-scale R&D effort in AG2P

Objectives


Develop a community vision for AG2P research


Identify (shared) research needs, opportunities, & gaps


Support seed projects to *outline community solutions* to research challenges


Communicate and disseminate our findings to the research community and the USDA

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What's Required to Realize this Vision?

Data (phenotypes, genotypes and environment/management practices), ideally from coordinated, multi-location, multi-year projects

New phenotyping technologies and analysis methods

A *community* of interactive biologists (crop + livestock), engineers and data scientists

Substantial new R&D investments

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What Does AG2P Research Deliver?

Phenotype (P) = Genotype (G) + Environment (E) + GxE

AG2P Research Promises to:

Increase rates of genetic gain and enhance our ability to efficiently breed for novel traits and environments

Improve our ability to provide farmers with evidence-based recommendations

Increase agricultural profitability and sustainability for the benefit of both producers and society

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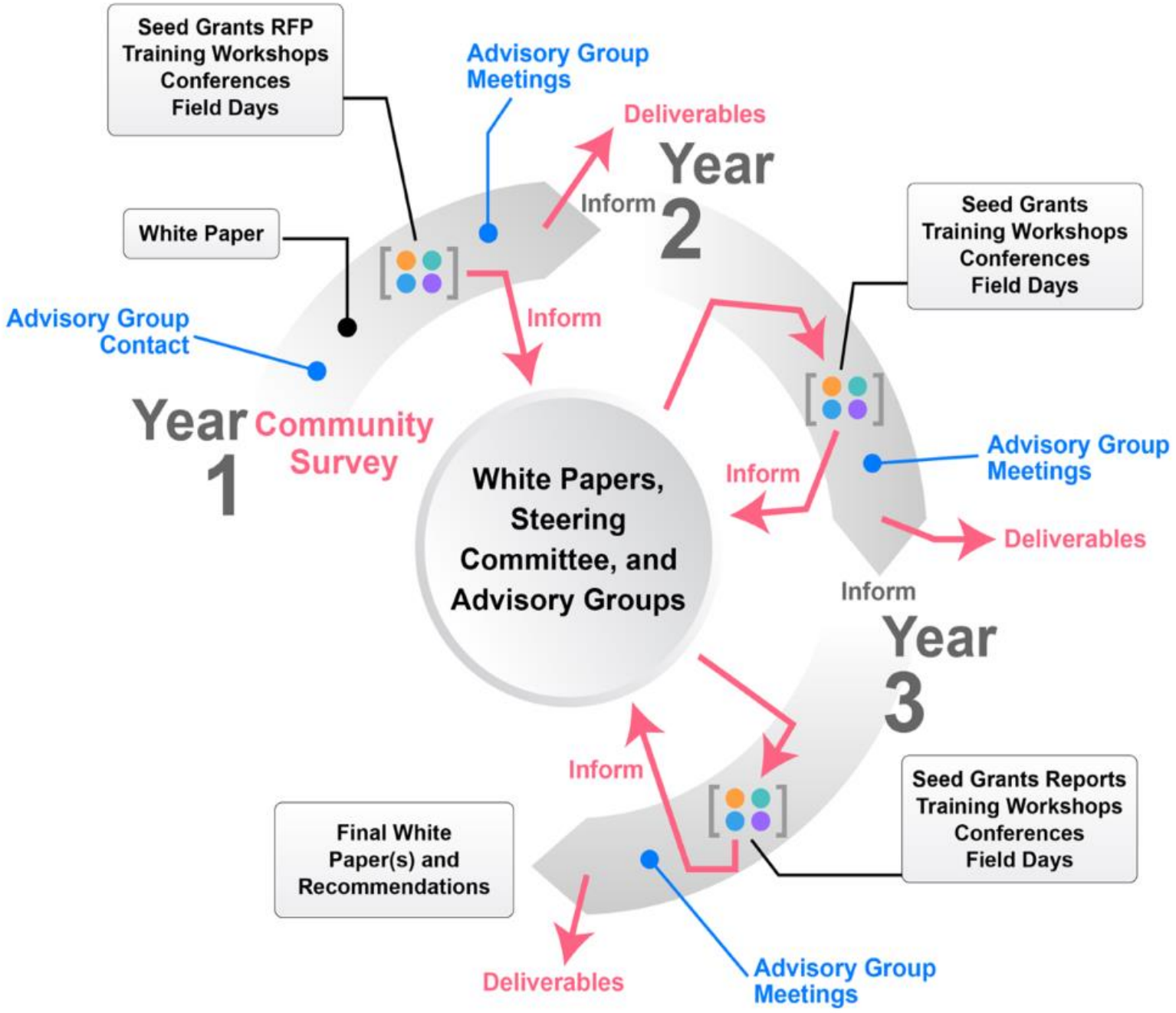
Activities and Timelines

Field Days

Training Workshops

Conferences

Seed Grants



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Field Days

Field Days / Virtual Open Houses

Goals

- Expose AG2P community to research activities and resources across crops and livestock
- Share research methods, approaches, capacities
- Identify research and capacity gaps and challenges for G2P research

Jack Dekkers (Lead), Eric Lyons, Brenda Murdoch, Pat Schnable

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Field Days

Field Day Schedule

Every 3rd Wednesday of month 10:30 AM – 12:00 PM US Central

- FD 1: **Introduction to the 2020 AG2PI Project**
- FD 2: **Virtual Communication & Engagement Across Disciplines**
- FD 3: **PhytoOracle: A Case Study in Automating Phenotyping**
- FD 4: **Implementation of Genomic Selection and the Future of Phenotyping in Dairy Cattle**
- FD 5: **Advances in Field and Controlled Environment Phenotyping at Purdue University**
- FD 6: **U.S. Aquaculture Industry and Research**
- FD 7: **Data Driven Growing: Tomato World**
- FD 8: **FAANG**
- FD 9: **Two Case Studies in G2P: Breeding Challenges in Fruiting Trees** - *July 21*

Recording of previous Field Days are available AG2PI.org

Reaching AG2PI Community

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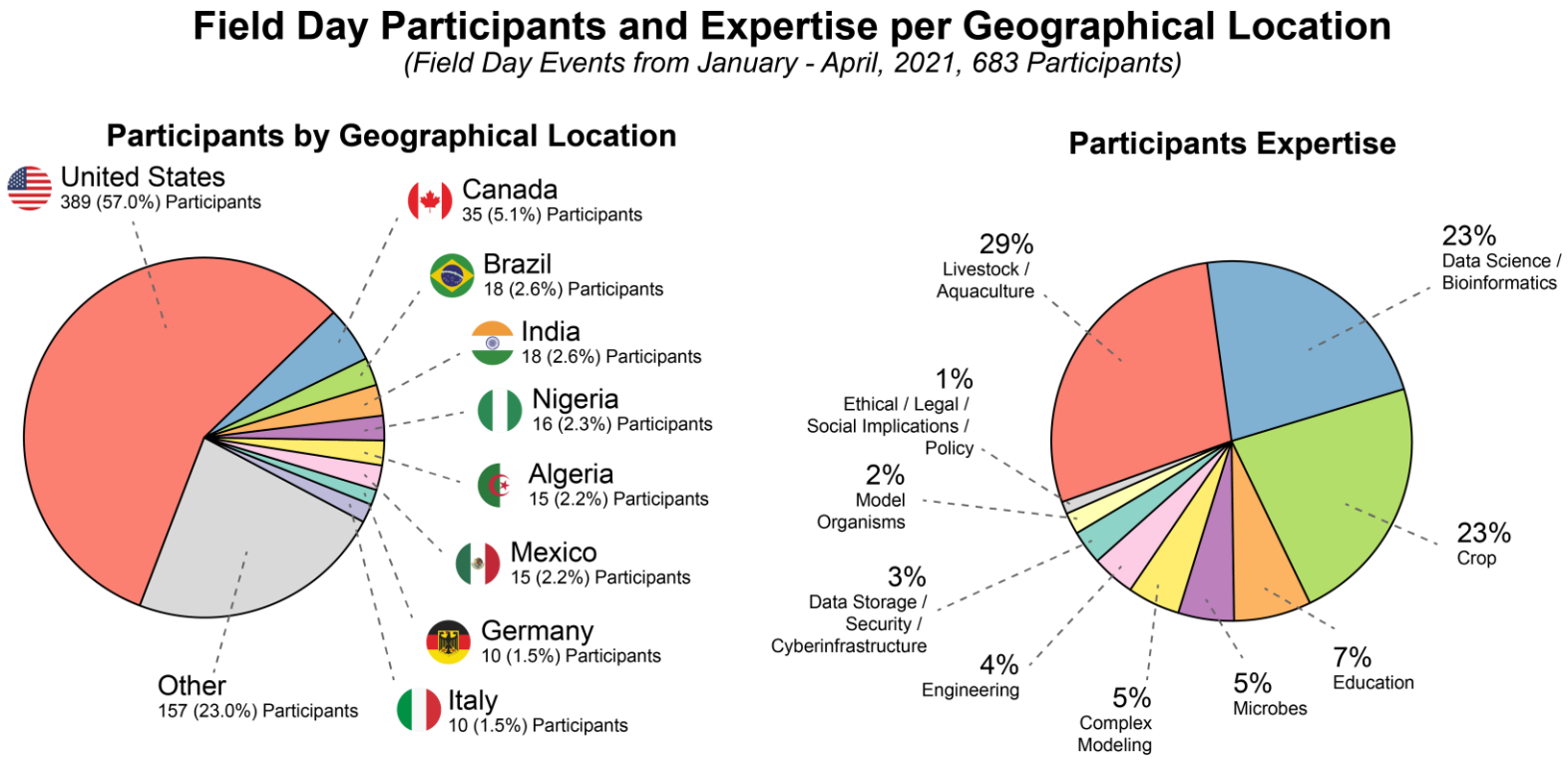
REACH US AT:

Visit https://www.ag2pi.org
(Join mailing lists)

@AG2PI

Slack workspaces
(asynchronous engagement)



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Training Workshops

Training Workshops

Goals

- To build technical strengths and future collaborative G2P communities
- Offer a suite of workshops to enable researchers from all backgrounds and computational skill levels to develop best practices, common vocabularies, and technical expertise around genomic and phenomic cyberinfrastructure, data tools and pipelines, statistics, and experimental techniques

Eric Lyons (Lead), Jennifer Clarke, Chris Tuggle

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Training Workshops

Training Workshop Schedule

12 virtual workshops per year, recorded and made available on AG2PI website

Introduce common AG2P analyses

- WS 1 (long format): **Biologists to computational scientists** : Carpentry style workshop
- WS 2 (long format): **Computational scientists to biologist:** Understanding the G2P
- WS 3 (short format): **SNP detection**
- WS 4 (short format): **GWAS**
- WS 5 (short format): Image Analysis for Phenotyping in Plants *July 22, 1-3 PM CDT*
- WS 6 (short format): Image Analysis for Phenotyping in Livestock *August 19, 3-5 PM CDT*

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Conferences

Conferences

Goals

- Bring people together to develop the vison and build AG2PI community
- Identify opportunities and resources within the crop and livestock communities
- Communicate and disseminate findings and support discussions across research and stakeholder communities

Chris Tuggle (Lead), Jennifer Clarke, Carolyn Lawrence-Dill, Brenda Murdoch

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Community Survey

Survey

Goals

- Collect community opinions on number of topics involving AG2P
- Collect information regarding the community's knowledge of AG2P and current resources
- Inquire about current AG2P research gaps
- Provide content for Conferences

Chris Tuggle (Lead), Jennifer Clarke, Carolyn Lawrence-Dill, Brenda Murdoch

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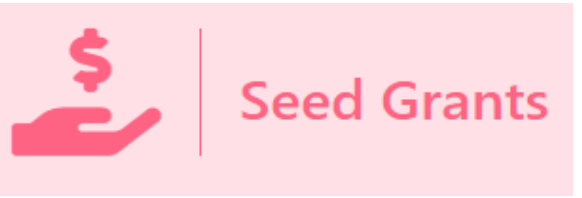
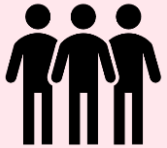


Seed Grants

Goals

- Promote collaboration and support the development and cross-pollination of tools, data, and ideas to enable and facilitate future G2P research
- Foster first steps towards the development of community solutions to
  - Research needs and opportunities
  - Gaps in physical infrastructure
  - Capabilities in data processing, analysis and management



Jennifer Clarke (Lead), Jack Dekkers, Carolyn Lawrence-Dill, Eric Lyons, Brenda Murdoch

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Seed Grant Mini-Conferences

Conferences

Conference 1 was used to identify gaps in knowledge, infrastructure, protocols, and provide information about the seed grant mechanism

Goals

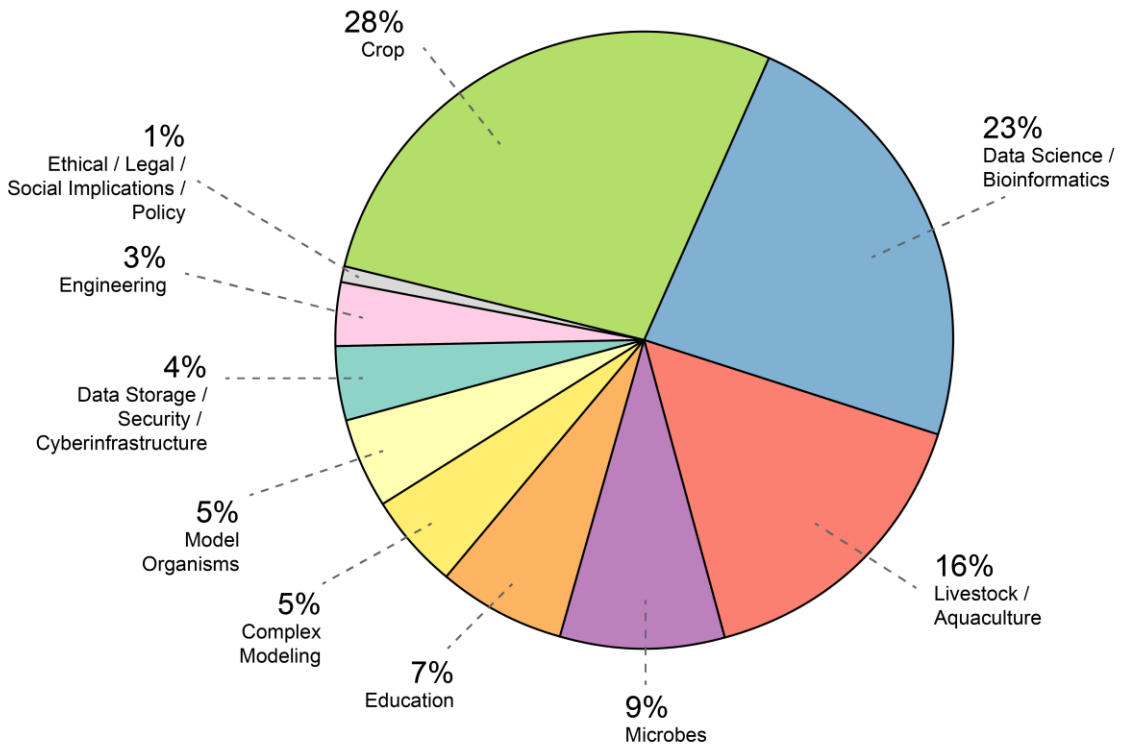
- Explaining and advertising AG2PI Seed Grants program
- Connect a diverse range of expertise in the research community
- Conference was recorded and posted on AG2PI website for asynchronous viewing

Round 2

Hold mini-conference on seed grant mechanism in August 2021

Conference 1 on AG2PI Seed Grant Participant's Expertise

(February 24, 2021, 174 Participants -- 119 Attended)



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First Round of Seed Grants

Seed Grants

Year 1/Round 1:

Released RFP in Jan 2021

Awards made to projects from each focus area

- Identify best practices, tools, and techniques for AG2P data sharing & storage
- Encourage cross-fertilization of existing or novel AG2P tools, data, or ideas
- Coordinate educational resources for expanding cross-disciplinary training
- Ethical, legal, social, ecological, or economic analyses of work in AG2P

- RFP submission deadline in March 2021
  - Sixteen proposals submitted
  - Seven awarded

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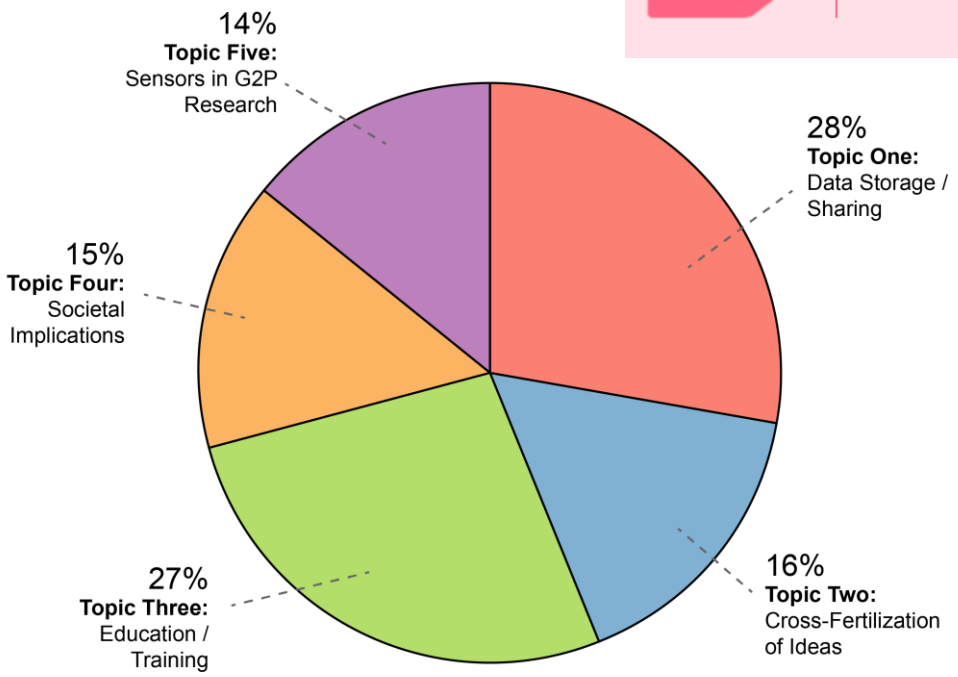
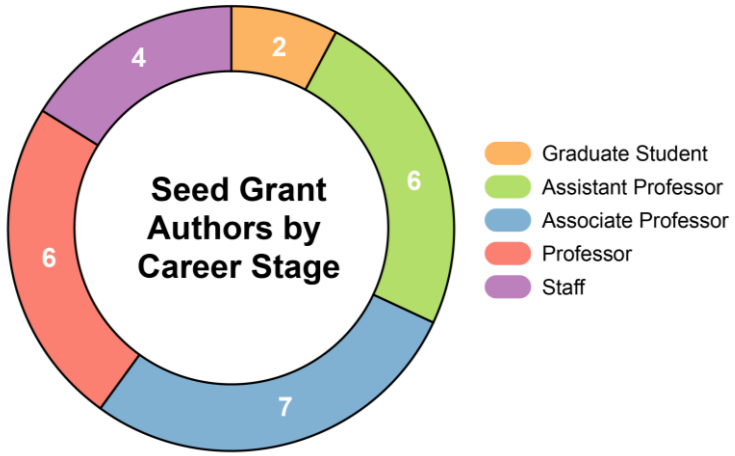
AG2PI Seed Grant Awardees

- Seed Grant awards were given in each of the five topic areas
- Seven awards ranged from ~$15-20k total cost, total awarded: $130,000
- The PIs of seed grant awards represented 15 unique institutions including USDA ARS, land grant universities, and historically black colleges and universities (HBCUs)

Seed Grants





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Seed Grants

Second Round of Seed Grants

Three award levels:

- Emerging: < $20k
- Enabling: < $50k
- Established: < $75k

Three *NEW* focus areas:

- Develop tools & datasets to advance genome engineering
- Mitigate environmental impacts from agriculture
- Encourage development of root stocks that increase carbon capture and can support grain crop covers

EXPANDED Seed project timeline of 6-15 months

Round 2 (2021)

- Release RFP July 15
- Mini-Conference in August
- Deadline in September

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Seed Grants

Third Round of Seed Grants

- Release RFP in early 2022
- Hold mini-conference on seed grant mechanism
  - Include team-building sessions
- RFP submission deadline in early 2022
  - Three levels of award
    - Emerging: <$20k
    - Enabling: < $50k
    - Established: < $75k
  - Seed project timeline of 6 - 15 months
  - Same three focus areas as Round 2, plus additional topics identified by community

Round 3 (2022)

- Release RFP in early 2022
- Deadline in early 2022

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Thank you!

Sign up for mailing lists and upcoming activities at

ag2pi.org

Executive Board Members

Dr. Patrick Schnable
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Dr. Jennifer Clarke
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Dr. Jack Dekkers
Iowa State University

Dr. David Ertl
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Dr. Brenda Murdoch
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Iowa State University

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