

Multistate Project (S-1075) 2024 Annual Meeting Minutes

When: July 25th – 26th, 2024.

Where: Raven Precision Agriculture Center, 1030 N. Campus Dr., Brookings, SD 57007.

Committee officers of 2023/2024:

Lin Wei (Chair)

Ewumbua Monono (Vice-Chair)

Tyler Barzee (Secretary)

Jian Shi (Past Chair)

Station attendees:

Abigail Engelberth, Ademola Hammed, Ananda Nanjundaswamy, Bin Yang, Bishnu Karki, Chengci Chen, Chris Saffron, Ewumbua Monono, Hassan K Jalalabdi, Zhengrong Gu, Juliana Vasco-Correa, Kasiviswanathan Muthukumarappan, Kent Rausch, Kurt Rosentrater, Lin Wei, Lingling Liu, Loren Isom, Mike Tumbleson, Sergio Capareda, Srinivas Janaswamy, Terry Walker, Tyler Barzee

Student attendees:

Abodunrin Tijani, Anne Cidreira, Bhawana Khadka, Camila Gonzalez Arango, Camila Valderrama, Emon Das, Enyonam Ahadzi, Fujunzhu Zhao, Humeera Tazeen, Johannes Ali, Kevaughn Prout, Kudirat Alarape, Manish Shrestha, Meheryar Kasad, Mohammad Shah, Muhammad Haris, Musiliu Liadi, Nirat Katuwal, Pradip Adhikari, Shamiul Alam, Sandeep Paudel, Santosh Thapa, Shishir Roka, Sumi Regmi, Tawakalt Ayodele, Tochukwu Ozor

Invited speakers: Victoria Finkenstadt, Mark Elless, Chenlin Li, Adam Hass

Meeting on July 25th

1. Meeting opening and invited speakers

- a. Dr. Kasiviswanathan Muthukumarappan (Muthu), started the meeting at 8:30 am. He introduced the meeting agenda, poster session plans, tours, and dining plans. He introduced Dean Joe Cassidy of College of Agriculture, food, and Environmental Sciences at South Dakota State University (SDSU).
- b. Dean Joe Cassidy welcome all attendees and then introduced bioprocessing initiatives, investment/facilities, and new industry activities in the areas as well as the plans of research and graduate programs (e.g., increasing PhD student enrollments) to move toward SDSU to a R1 institution. For example, the College of Agriculture, food, and Environmental Sciences is the largest research engine on campus, which plan to increase PhD students from current 15 to 30 per by 2030.
- c. Dr. Lin Wei (Chair) introduced the Committee officers of 2023/2024, Dr. Ewumbua Monono (Vice-Chair), Dr. Tyler Barzee (Secretary), and explained Dr. Jian Shi (Past Chair) was absence this annual meeting due to traveling outside the country. After that, he introduced 4 invited speakers, starting with Dr. Vicki Finkenstadt from USDA NIFA, Dr. Mark Elless and Dr. Chenlin Li from DOE BETO, then Mr. Adam Hass from POET company (the largest bioethanol producer in the world).

- d. The first invited speaker, Dr. Vicki Finkenstadt, joined the meeting virtually. She introduced her research background in bioplastic production and then the national programs (A153 and A1414: Biorefining and biomanufacturing), in which she leads in USDA NIFA. She discussed the main goals and funding potentials and opportunities for each program. She mentioned a move away from bioplastics since there are many other potentials with the intermediates. She emphasized circular bioeconomy and the concepts of reducing wastes as close to zero as possible. She reminded the opportunities of USDA AFRI programs on Education and Workforce Development for pre-doctoral and post-doctoral applications, which has almost 50% funding rate right now for short applications and need mentoring component. She mentioned a pathway to submit a standard grant to A1531 program and a fellowship application for students. She said there wasn't any applications received in the last year. She also introduced the USDA AFRI SAS program, which fund large integrated projects (including Research, education, extension); SBIR and STTR programs for startup commercialization on biofuels and biobased products. Specifically, STTR is for universities partner with small businesses. For a question from Ewumbua Monono about citizenship requirements on AFRI fellowship grants, she answered that the PDs need to be citizens. Another question about fellowship grants if students can apply independently of standard grants? For graduate students, she said that the students need to have their advisors or professor in the institutions to be in their applications as part of the grants, but post-docs can apply independently with their institutions and mentors. Another question about moving from bioplastic to special chemicals, she answered that the research need to focus on replacing special chemicals coming from petroleum with bioplastic at scale conversion or production. Chris Saffron questioned the resilience of programs during political leadership changes? She answered that no one knows what congress will do but putting together a RFA cover 2 years. Next USDA NIFA RFA will be out in November or earlier this year. So at least a short-term weathering of administration change. Julianna Vasco-Correa from PSU questioned "what to do for smaller projects that don't focus on the whole supply chain?" She mentioned that most seem to be very focused on final products but concern foundational ones are not competitive. She said that proposals used to be more emphasis on foundational science, but the trend has been 40% basic and 60% applied but in future may be 60% basic and 40% applied. Examples of foundational sciences, such as molecular biology, catalysts, etc. If doing foundational work, tell reviewers that clearly get ahead of questions of "will that be economical?" "Well, that's not the point of this one, it is foundational". Question from a SDSU student Anne Cidreria about review process and how to catch the eyes of reviewers. She said that the program A1531 has 45 reviewers, so proposals must split things up and then shuffle together. At least 3 reviewers per proposal and paired up by area of expertise. First, isolated review and number rating, then a meeting to talk and rank. Funding rate is under 9% right now. To catch eyes, the proposals don't distract them with "things", "figures are more memorable than pages of text". The panelists may get tired. The proposals should use bold text to call out the main ideas. Reviewers want to know what the project outcome are. If it's foundational knowledge, tell them. If it's the production and yield of a particular chemical, tell them. Don't let them get caught up on tangential details. Need to have the team members/staff in the project clearly aligned with tasks, timeline, and budget alignment. Misalignment example, one of Co-PIs is doing 70% of work because have equipment but only getting 30% of budget. Need to describe

why that's the case and why it makes sense. Clear direction is most important thing and what happens if it doesn't work? If something is high risk but high reward, what is Plan B? Objectives need a contingency plan so other objectives don't fail if one part does. Question about how critical preliminary data for AFRI is, she answered that proposals need enough data/information to show the feasibility of ideas for standard grants but there are also other options, applying seed grants which don't need much preliminary data.

- e. The invited speakers from DOE BETO, Dr. Mark Elles and Dr. Chenlin Li. Bothe joined the meeting virtually. Dr. Mark Elles is a technology manager in BETO. He introduced the team members of BETO by terrestrial and algal feedstocks. He introduced the critical program areas of BETO on feedstock technologies, advanced algal systems, conversion tech, systems development and integration, and data modeling and analysis. Also, the strategic goals, multi-year program plans, decarbonize transportation, decarbonize industry, decarbonize communities, and so on. He mentioned the DOE 2023-billion-ton report (4th in series) released in earlier this year to update with the latest economic conditions and capacity of biomass feedstocks in U.S. Oilseeds and macroalgae as new feedstocks were added in this report. He refers to the main result of the report showing 1.5 billion tons of feedstocks available in a mature market (with sustainability constraints included). He also introduced some current opportunities, new programs on regional resource hubs for purpose, for example, grown energy crops (algae, herbaceous, intermediate, short-rotation woody) with \$27-29M available for this opportunity (2 – 5 awards). Long-term field trials included so period of performance up to 10 years. Other opportunities, technologies scaling up, community funding, conversion of wet wastes and mixed algae, conversion of waste-to-energy, and SBIR for bio-based materials. One tip he reminded is that DOE agencies need stakeholders' inputs in the projects by holding workshops. He encouraged PIs/PDs should try to attend DOE workshops because FOAs come out of workshop meetings. He introduced the Algae Prize teams. He also recommended joining BETO mailing list to hear about FOAs and workshops and sign up to be a reviewer (DOE BETO is in need and it is paid!). Dr. Chenlin Li is a Program Manager in BETO. She echoed on Dr. Mark Elles' presentation. During the Q&A time, Chris Saffron asked the question related to 2023-billion-ton report on the sustainability assumptions, specifically about soil carbon, in next report do a better job in below ground carbon? Mark responded that it will be in mind next time and connects to current long-term projects that will be funded soon and will include far below ground biomass. Another question from NDSU about land-use change and biodiversity and carbon offset if including dedicated energy crops? Mark said "Yes, there is a section on land-use change and data collected by projects should inform." the questions asked by Dr. Chengci Chen from Montana State University were how many proposals received for regional hub and how many can be funded? Mark answered he was not sure how many were received but 4 – 10 probably awarded and will depend on award size.
- f. The 4th invited speaker, Mr. Adam Hass, from POET company. He is the director of Design Engineering in POET. He introduced the vision and mission statements of the POET, which relate to achieve "natural balance". Began in 1983 on a corn farm, POET bought a defunct ethanol plant in 1987 and made a business. POET now have 34 biorefineries in upper Midwest producing 3 billion gal of bioethanol per year. 2,400 employees, which make it the largest bioethanol producer in the world, the largest

shipping too, for instance for DDGs to Asian markets. He described the company and structure: a R&D division in Sioux falls and a research pilot plant in Europe. In-house EPC (Engineering Procurement and Construction) team and public policy team in DC. New biogenic CO₂, which collect CO₂ from fermenters and sell for soda, meat packing, etc. He introduced the innovations in bioethanol production, where no heating is required to gelatinize corn and go straight from corn with water to fermenter. They convert corn oil into biodiesel market primarily, also make CO₂ dry ice, purified alcohol, corn protein, and dried-distillers-grains (DDGs) for feeds. He introduced the sustainability aspects of POET company by reducing energy usage by 18%, increasing biofuel yield by 8%, and reducing water use by 20% (zero water discharge to environment at their facilities). POET have now added biomass to energy, CHP, carbon capture, etc. Also releasing a sustainability report in recent years. POET targets carbon neutrality at all facilities by 2050. They have been commercializing a lot of things now, for examples, digesters (currently building three 2-million-gal digesters on dairy manure nearby), injecting gas to pipeline and returning digestate to field. Waste wood and/or corn stover was used in boilers on some facilities. Carbon sequestration by actively taking CO₂ and then putting it into the ground and supported by inflation reduction act so fast movement forward. POET also invested in wind and solar energy. Low carbon farming also part of their strategies. Setting up incentives to farmers for reducing their inputs to reduce carbon intensity (CI). Biofuel production and agriculture drives the CI score so there are several strategies they are employing to reach it. The challenges of these strategies are mostly economic, not technological. Inflation reduction act has supported some of the efforts. The company plans to include many other co-products and technologies to reduce CI and offset more petrochemical intermediates. During the Q&A time, a question asked by Dr. Hassan Khodaei Jalalabdi from Auburn U, “pyrolysis process can produce 90% of the energy required for the process, have you considered using this technology for a portion of the energy needs of POET plants?” Adam answered that “Yes, very interested in pyrolysis from corn stover and see it as a future project but need support. Corn stover is challenging to work with pyrolysis. Mass/Energy balance supports that pyrolysis syngas could completely support an ethanol plant”. A question asked by Dr. Chenlin Li from (DOE) about corn stover pyrolysis but not fermentation to ethanol, correct? He answered “Yes, POET had a project on corn stover to ethanol 2014 – 2019 that was successful but no longer running since the incentives to make it economically feasible wasn’t possible”. POET had the technology but couldn’t make it competitive. Now most efforts are in direct energy production in use of corn stover.

2. Project Committee Updates

Dr. Wei reported that the S1075 project renewal proposal was approved. The new multistate project (S1075) period is from 10/2023 – 9/2028. He thanked the 2022-2023 team for proposal rewriting. He also appreciated the team of 2023-2024 committee for their planning and preparation for the 2024 annual meeting this year and thanking leaders of each portion of the programs. A total of 49 registrants participated in the annual meeting this year (23 professional and 26 students). He thanked Chris Saffron and Jen Riebow for leading the NSF travel grant application to support the students attending this meeting. He made a motion to move the meeting to next item for each station to present their 2023 updates reports.

3. Experiment Station Updates

A total of 11 station representatives reported their experiment stations' updates in 2023-2024, respectively, by following sequence number:

- 1) Auburn University
- 2) Iowa State University
- 3) University of Kentucky
- 4) North Dakota State University
- 5) Texas A&M University
- 6) South Dakota State University
- 7) Penn State University
- 8) Washington State University
- 9) Purdue University
- 10) Montana State University
- 11) Michigan State University

After the station updates reports, Dr. Wei reminded the station attendees to submit their station updates reports before August 8th so that the project committee can compile an annual report for submitting to USDA NIFA.

4. A meeting break was taken for lunch and student poster session 1.

During the lunch break, Dr. Muthu offered a tour of the ABE department building for the attendees.

5. Business Meeting

- a. Dr. Wei opened business meeting after lunch. First business item was to approve 2023 annual meeting minutes, which were sent out before this meeting. The minutes were also reviewed on-screen during the meeting for attendees to read. Dr. Muthu moved to approve the minutes, seconded by Chris Saffron, no objections, minutes unanimously approved.
- b. New business. After this annual meeting, Ewumbo will be next chair, Tyler Vice is vice chair, and a new Secretary need to be selected for FY 2024/25. Discussion of a new nomination. Abby Engelberth from Purdue nominated by Ewumbo, Bishnu (SDSU) seconded, Abby accepted the nomination. Dr. Muthu described the main responsibilities of the roles to include serving on the committee and then hosting the S1075 Annual meeting at the university during the chair year. Muthu moved to close the nomination, seconded by Chris Saffron. Dr. Wei announced Abby Engelberth will be the new Secretary for 2024/25 year.
- c. Discussion on hosting the 2025 annual meeting. Ewumbo suggested the campus of North Dakota State University in Fargo may be an option. Fargo is a large city; the airport is just 5 minutes to the university; a lot of activities and companies in the area. All major airlines in Fargo makes it easy to get there from Toronto, where the ASABE 2025 AIM will be held on July 13 – 16th. He also asked the budget and tips for obtaining extra sponsorship. Juliana mentioned that it is nice to collocate with the ASABE 2025 AIM, but that isn't possible for the ASABE 2025 AIM in Toronto, then, Fargo was proposed. Tyler Barzee raised a question about those who and why were not in attending the 2024

Annual Meeting at SDSU this year. Dr. Muthu suggested that every other year it might be good to collocate with ASABE. The main expenses are hotel, food, and room when collocate. He also suggested to check with ASABE Jessica Bell to see what it would take to collocate in Toronto. It is also raised that many students may not be able to attend in Toronto because of visa issues. It was mentioned that visa can be obtained but it would take time and \$200 per student. Does student have to bear cost? Depending on funding. Dr. Saffron brought up the benefits of minimizing distance between meeting and AIM, which is good for Fargo and Toronto. Dr. Mike Tumbleson reminded that it needs special permission to leave 48 states. Fargo was selected for the S1075 annual meeting next year. Dr. Muthu asked if any problems with August/September, but it was concerned possible overlap with classes. Dr Muthu suggested sending a Doodle to all station representatives and getting feedback for the meeting date, eventually, the S1075 annual meeting in Fargo was decided being held on July 10 – 11th, 2025.

- d. Discussion on research collaboration. Dr. Muthu and Ewumbuo discussed learnings from last renewal, especially related to the need to document and build collaborations across stations. Need to have a specific station in report about research collaborations built across stations. Dr. Tumbleson mentioned that the early design and intentions of multi-states to support graduate students and early career faculty to introduce themselves and build collaborations. He pointed out that it used to be that full professors' job was helping new professors to get tenure, now that structure is limited so need multistate structure to help.
- e. Discussion on student travel award. Chris said that we may probably have some left over funds, which may be used for next year, Chris mentioned that NSF wants the travel grants to open to the students in more universities outside of S1075 project, but that efforts weren't entirely successful. He also suggested a change to station reports to "open doors" and more effectively build collaborations rather than brag.
- f. Discussion on annual meeting proceedings and updates report. Dr. Tumbleson discussed the benefits of the book of our meeting abstracts and the importance of having something tangible. He mentioned that DOE already asked for 20 copies of the book. Juliana suggested that the station updates may have more research technologies, mechanism/principles, status or discussion, only including numbers and things in the written annual reports. Chris proposed a structure of station updates to be brief but have a barriers/hurdles /questions part that uses the minds in the meeting to help and build collaborations across stations. He also mentioned that the invited industry talks are good but the one from POET today better to open their unanswered questions and how we might help. Dr. Bin Yang from Washington State University mentioned duplicative efforts in the slides and written summaries. He suggested "powerful brains, small talks", sounds like small breakouts to work in-depth on something. Dr. Wei gave some background on why the format is the way it is. This may Help the members to put together their station updates before August when it is needed and allows everyone to introduce their work. Tyler asked for clarification on Chris' suggestion, not do away with summaries but to end with barriers and questions and any specific asks for the community. Julie Carrier clearly told us that if we don't build more collaboration and document it, will have a hard time on renewing the S1075 project next time. Another suggestion was to make a database of expertise and tools that each member brings to find connections and go for big grants together. One question was raised on the website of S1075 project, was it established by

Dr. Jian Shi? There may be a problem/challenge with the continuity of the website. Tyler agreed to ask Jian about website status. He suggested the new committee may need to do something to help publicize and make accessible to group. The last question was asked by Dr. Hassan K Jalalabdi from Auburn University about industry collaboration resources. Dr. Wei recommended contacting S1075 project chair/advior to learn more and resources.

6. Student Poster Competition

The student poster competition was stated at 3:00 pm and ended at 4:00 pm. The attendees participated in the poster session. Nine judges from the professional attendees evaluated all presenting posters and then selected 4 top posters to be the competition winners.

7. Meeting tour to the POET Bioproducts Center in the SDSU Research Park

After the poster competition, Dr. Muthu and Dr. Wei brought the attendees to have the meeting tour to POET Bioproducts Center in the SDSU Research Park and learned its operation models and potentials from 4:10 – 5:00 pm.

8. Network reception

- a. After the meeting tour, Dr. Muthu and Dr. Wei brought the attendees to have the network reception at McCrory Gardens from 5:10 – 7:00 pm.
- b. Dr. Muthu announced the 4 winners of student poster competition during the reception. Dr. Wei delivered each winner a certificate and (\$75) prize, respectively. The 4 winners were:
 - 1) Nirat Katuwal (SDSU)
 - 2) Enyonam Ahdazi (UK)
 - 3) Kevaughn Prout (SDSU)
 - 4) Musiliu Liadi (NDSU)
- c. Dr. Muthu reminded the attendees to participate in the industrial tours on July 26th and then he adjourned the meeting on July 25th.

9. Industrial tours on July 26th

- a. The attendees had a tour to the SD Soybean Processors, Volga, SD to learn soybean oil extraction and potentials for biofuel production from 8:30 – 9:30 am.
- b. The attendees had another tour to the Valero Renewables Processing Plant at Arora SD to learn bioethanol produced from corn grain from 9:45 – 11:30 am.
- c. After a meeting lunch, the S1075 annual meeting was adjourned at 12: 30 pm July 26th.