

Optimizing Human Health and Nutrition: AFRI SAS From Soil to Society Year 3 Invested Parties (Education and Extension) Report August 2024

Background

In 2021, Washington State University (WSU) and its partners received funding from the United States Department of Agriculture (USDA) National Institute of Food and Agriculture (NIFA) for an Agriculture and Food Research Initiative (AFRI) Sustainable Agricultural Systems (SAS) project, called Optimizing Human Health and Nutrition: From Soil to Society (herein referred to as the Soil to Society (S2S) project). According to the project's proposal, the project's long-term goals are to create more nutritious, affordable, and accessible whole-grain-based foods through: 1) investigating the contribution of novel, biofortified crop varieties and food products to human health through clinical and epidemiological evaluations, and 2) developing and deploying nutritious food products made from improved crop varieties grown within sustainable cropping systems.

This multi-institutional and transdisciplinary project will employ a soil-to-society pipeline strategy that addresses gaps in current knowledge and traces the flow of nutrients from agricultural systems and food production to human consumption. The strategy will culminate in the synthesis of more sustainable agricultural management strategies and healthy, affordable food products to meet the needs of diverse individuals and communities.

To address short-, medium-, and long-term goals, the project's key objectives are:

1. **Soil Management and Cropping Systems:** Understanding and applying the roles of environment, soil, and cropping system management on soil health, farm economics, and the nutritional content of the grain for each target crop.
2. **Plant Breeding and Genetics:** Developing new varieties of barley, wheat, peas, lentils, quinoa, and buckwheat with enhanced health and nutritive value.
3. **Human Health and Nutrition:** Confirming the impact of nutritionally enhanced varieties on key indicators of human health and assessing acceptance using consumer panels.
4. **Food Science and Product Development:** Developing a diverse and innovative suite of flavorful, affordable, and nutritious food products that will be accessible to consumers from all income levels.
5. **Community-Based Health and Nutrition:** Conducting population studies to explore impacts on dietary quality by increasing target crop consumption in US diets and assessing consumer acceptance and valuation of whole-grain-based and legume-based foods.
6. **Education:** Focusing educational capacity on secondary student instruction, teacher professional development, and farmer training.
7. **Extension:** Disseminating knowledge gained and products developed to stakeholders across agriculture, food, and health sciences and to communities, schools, and underserved populations through a wide-reaching extension effort.

Purpose

As part of the project evaluation, the Soil to Society project leadership contracted with the Office of Educational Innovation and Evaluation (OEIE) to evaluate the progress, implementation, and impacts of the project. Project leadership collaborated with OEIE to develop and conduct interviews with education and extension (EE) members to learn about their perceptions of progress made toward project objectives,

project implementation, collaboration within the project, and perceived benefits from participating in the project. A copy of the interview questions is provided in Appendix A.

Methods

On April 4, 2024, OEIE sent interview invitations to 15 Soil to Society EE members identified by project leadership. The email invitation requested each contact to provide two to three dates and times they were available between April 15 and April 30 for an hour-long interview, along with a copy of the interview questions, if they were willing to participate. OEIE periodically emailed reminders to encourage team members to respond until the interview window (April 15-30) began, plus one final reminder on April 16.

Respondents

OEIE received responses from nine of 15 team members, with one individual opting out due to a mismatch (did not contribute to EE efforts), for total of eight participants and a response rate of 60.0%. One individual indicated they were transitioning out and had their replacement participate in their stead.

- **Background:** Nearly half the respondents ($n = 4$) identified as having professional (non-faculty) experience in EE, followed by education and outreach (EO) experience within academia (e.g., as a research/teaching faculty; $n = 3$), participation in EO events (volunteer work; with farmers/growers; $n = 2$), and having a degree in education or outreach (general, agricultural; $n = 1$). (Note: Respondents used the terms “EE” and “EO” interchangeably.)
- **Role:** Nearly half the respondents ($n = 4$) identified as objective leads. Respondents also identified as engaged in high school (HS) internships or curriculum building ($n = 2$) while not formally part of the education team, people with roles specifically in EE ($n = 2$), teachers of undergraduate and graduate students ($n = 2$), a USDA Agricultural Research Service partner ($n = 1$), and a team scientist ($n = 1$).
- **Initial Involvement:** Nearly all respondents ($n = 7$) began their involvement in the project by participating in the grant proposal. Some also identified that they had previously worked with some or many of the project team members before the project started ($n = 3$), and only one individual identified that they were not previously involved with the team or the research.
- **Project Familiarity:** Nearly all respondents identified that they were familiar with at least some aspects of the research (their own discipline, food products, plant breeding, post-harvest studies, work with Bread Lab or Viva Farms). One individual stated they were not familiar with the project information and only hears aspects of the research in annual meetings. Some individuals identified that the project was an evolution of previous research ($n = 2$) and that the work parallels work being done at Bread Lab ($n = 1$).

Analysis

Interviews were conducted online via Zoom and analyzed by: 1) transcribing transcripts, 2) qualitatively coding for naturally occurring themes across transcripts using the qualitative analysis software Atlas.ti23, and 3) quantifying the coded themes by frequency and compiling them into summary tables supplemented with relevant quotes (see Appendix B).

Highlights

The following provides the highlights of the data analysis that is summarized in Appendix B. *Note. This report uses the abbreviation EE for Education and Extension or EO for Education and Outreach, which are used interchangeably. Additionally, HS is used for high school, UR for underrepresented and URG for underrepresented groups.*

Implementation

Respondents were asked to describe their outreach and education efforts, highlights from their experience, and other aspects of EE implementation. Overall, respondents ($n = 9$) indicated that they felt they were behind schedule for various reasons (waiting for research results, COVID-19 or organizational delays, lack of farmers to implement research, equipment problems, other priorities, personnel changes, etc.). However, some respondents indicated they were on schedule ($n = 5$) sometimes despite delays, and one individual said they felt they were ahead of schedule ($n = 1$). One respondent reported they did not engage in EO efforts specific to the AFRI SAS Soil to Society project.

Respondents engaged in a wide variety of EE activities, most frequently providing or facilitating research experience education for HS, undergraduate, or graduate students (e.g., lab work, summer jobs, engagement, general research, internships, and specific programs like USDA Science in Action and Upward Bound; $n = 5$). Respondents also engaged in many other activities, including farmer EO ($n = 3$), public farm-to-consumer activities and education ($n = 3$), social media EO efforts ($n = 3$), curriculum and course development for HS teachers and interns ($n = 2$), marketing outreach to industry ($n = 1$), and student recruitment ($n = 1$). Within these activities, respondents identified ways they integrate project research results into EE efforts, shown in Figure 1.

Figure 1. Respondents incorporate project research and materials into their EE efforts in six primary ways.



Two individuals indicated they have yet to integrate project research into their EE efforts, which they attributed to lack of data (either from projects not generating results yet or from results not being provided to them).

When asked how they have implemented lesson plans, experiments, and activities learned from the project and to what extent, respondents most frequently reported that they integrate at least some aspect of project research, materials, and concepts into courses or curricula (HS, undergraduate, and graduate level; $n = 3$) and that they integrate project data and activities into extension activities (e.g., workshops, field days; $n = 3$). One individual involved in the HS internship indicated they implement internship activities (experiments, poster sessions, etc.) in real time with the research team. Respondents reported less frequently that they discuss the project or grant in their EE efforts but would like more concrete implementation of project findings ($n = 1$) or that they do not implement S2S lesson plans, activities, or experiments in outreach efforts ($n = 1$).

When asked to provide highlights of their experiences, respondents provided a wide variety of examples related to both their individual and the overall project EE efforts (see Figure 2). Only one individual indicated they did not feel they could speak about general project highlights because they feel siloed from the overall project progress.

Figure 2. Developing HS students’ skills and interest and exposing them to career options was the most frequently reported highlight of respondent EE efforts.

Developing HS student skills, interest, and exposing them to career options (e.g., presentations, publications, research involvement). ($n = 3$)	Engaging with students (e.g., educating on nutrition, getting their feedback, aligning their interests/skills with research). ($n = 2$)	Baking, selling, and teaching about whole grains (e.g., the approachable loaf; bakery pop-ups). ($n = 1$)	Incorporating project research in teaching regenerative ag classes. ($n = 1$)
	Research discoveries and progress (e.g., issues with low levels of Zinc, generating seeds for other objectives to use). ($n = 2$)	Recruiting high quality interns. ($n = 1$)	Effectively disseminating project information (via blog posts, social media, etc.) ($n = 1$)
		Conducting agronomy field visits. ($n = 1$)	Observing integration and adaptation of research into other areas. ($n = 1$)

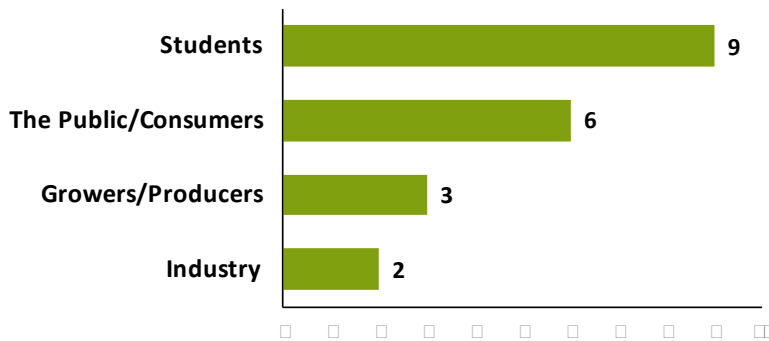
Education and Outreach Goals and Target Audiences

The goals of the work described above vary depending on the EE component the respondents were part of. In general, there were three major goals for respondents. First, most respondents ($n = 5$) indicated their goal is to train the future generation of agricultural researchers (e.g., how to build greater diversity, skills, knowledge, and principles of grains/food processing and to teach, foster interest in, and increase exposure to transdisciplinary experiences). The second most frequent ($n = 4$) goal of EO efforts was to identify barriers along the pipeline of integrating nutritious crops into the market stream (e.g., understanding consumer literacy and barriers to developing and releasing crops). Finally, the third goal (n

= 3) was to educate farmers on soil health and cropping system management options. Outside of these three overarching goals, one individual indicated they have disseminated information but would appreciate guidance and support from leadership to help facilitate their EO efforts.

Similarly, respondents' target audiences varied by the type of EO the respondents were engaged in. Overall, students were the most frequently cited target of EO efforts (Figure 3). However, the student category was a conglomerate of HS students ($n = 5$) and graduate or undergraduate students ($n = 4$). Please note that some respondents worked with both categories of students and thus the number of respondents who worked with students is seven. Without the conglomerate, the public and consumers of all ages would be the most frequently reported ($n = 6$) target for EO efforts. Industry and growers are the least cited ($n = 2$ and 3 , respectively). The most targeted groups, however, were not necessarily the most reached. The targets that were reached the most were the general public (several thousand via podcast) and farmers and growers (roughly 250 people). The breakdown of students reached is as follows: graduate students (roughly 75 students), HS students and interns (roughly 25 students), and undergraduate

Figure 3. Students were the most frequently cited target of EE efforts.



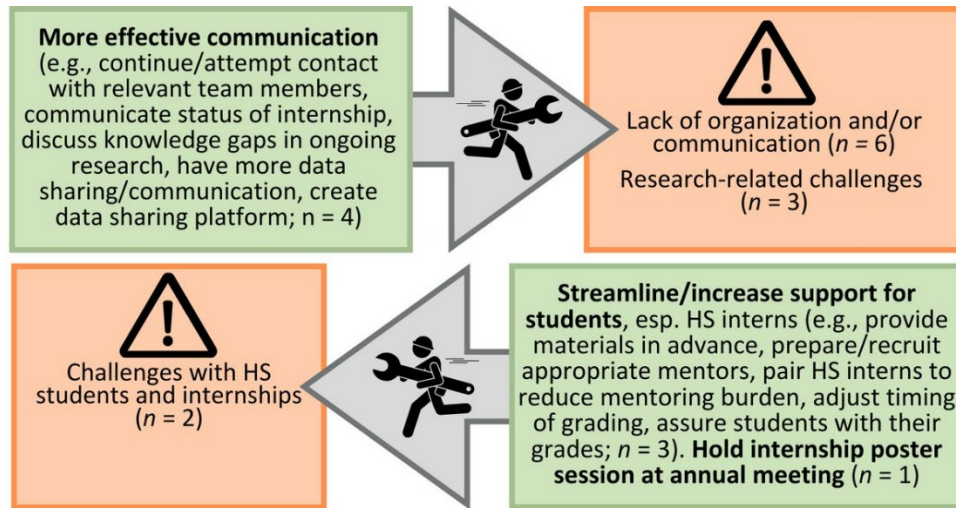
Note: The category of students is a conglomerate of the subcategories of HS students ($n = 5$) and graduate or undergraduate students ($n = 4$).

students (five or fewer). One individual estimated they likely reach hundreds of students and the public over a given year through classes, internships, and the like. All this being said, it is important to recognize that some of these efforts are through direct reach and others are through indirect reach. Student reach, for example, may show smaller numbers than those reached by podcast; however, students are receiving direct, in-person experiences typically over a period of time rather than a one-time virtual or audio experience.

Barriers and Mitigation Plans

Respondents were asked to identify the kinds of barriers they encountered in their EE efforts and their subsequent mitigation plans and support. Figure 4 shows the most frequently reported barriers (orange boxes) and their mitigation plans or suggested solutions (green boxes). More specifically, project communication and organization were cited as limiting opportunities for EE (e.g., no contact from leadership about EO, teams that are too siloed for interdisciplinary collaboration, and feelings of a general lack of communication about EE efforts). Respondents also experienced research-related challenges including issues such as soil quality, climate impacts, the inherent slowness of the research, acquisition of data from other teams, and adaptation to new evidence. Challenges related to HS students and internships primarily involved scheduling, some students' need for extra support, time consumption, the need for additional enthusiastic and prepared mentors, and difficulties recruiting students in remote areas ($n = 2$).

Figure 4. Respondents’ most frequently reported EE challenges are in orange boxes, and the proposed solutions are in green boxes.



Impact

With the variety of EE targets, the impacts of the EE efforts are also varied. The most frequently reported ($n = 4$) impact was general gains in student skills or abilities (e.g., in ag-related knowledge career interest, confidence, obtaining internships and jobs), followed by benefits for graduate students (job offers, gains in knowledge, supervisory experience, support networks and co-learning, interdisciplinary collaboration; $n = 3$) and new knowledge and its application or implementation among producers (e.g., increased awareness of soil management practices, development of new products $n = 3$).

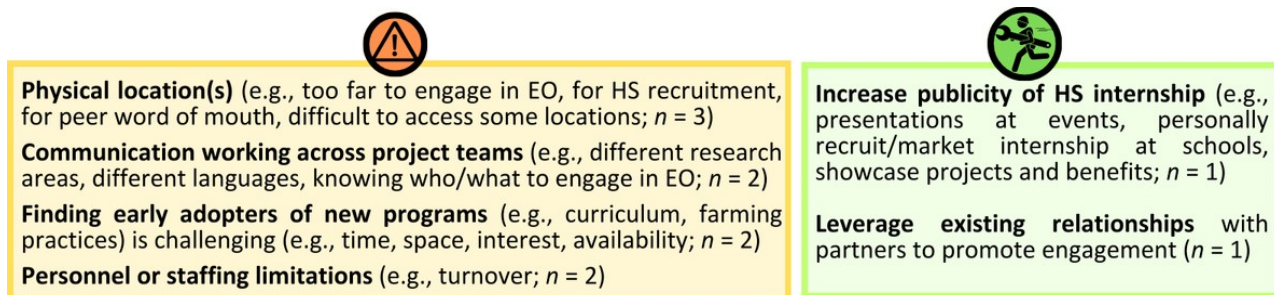
When prompted to elaborate on how efforts have inspired the next generation in agriculture-related careers, the majority of respondents ($n = 6$) reported that the professional development opportunities serve to inspire the students (e.g., through mentorship, by aligning skills with interests and life applications, career exposure, professional network expansion, transdisciplinary/diverse team skills and interest). Only a few responses were provided relevant to UR minority students specifically, with the majority of those respondents recognizing that UR students are participating but also reporting they do not feel they can speak to how the experience is inspiring those students ($n = 2$). When asked for suggestions to improve diversity and representation, respondents most frequently advised to expand EE efforts in schools (e.g., improve bilingual education efforts, recruit students from other countries; $n = 3$), but most respondents ($n = 5$) stated the project already has inclusion of URGs.

“ We work with a lot of historically underserved farmers. That's just who we are. And from a USDA category, that includes beginning farmers and socially disadvantaged farmers. So basically, everyone in our program is a historically underserved farmer. So, it's just by nature of what we're doing and who we serve. ”

At the policy and agricultural practice level, most respondents ($n = 6$) identified that it was too early to determine or that they were otherwise unable to answer whether the project has led to any impacts in practices, policy, or decision-making. When it comes to impact on the general public and consumers, many

($n = 4$) reported that there were no or only anecdotal impacts. Reported barriers to these efforts were manifold (Figure 5), though some interviewees ($n = 3$) encountered none.

Figure 5. Public/consumer EE challenges are on the left and suggested solutions are on the right.



Because plans may change or be adjusted based on perceived impacts (or lack thereof), respondents were asked what their EE plans were for the remainder of the project, whether plans have changed from the original goal, and what kind of support they may need. Respondents were largely in agreement; most ($n = 7$) reported that they are planning to continue (or begin) incorporating project knowledge, materials, and research into their upcoming workshops, farmer EE, and classes (e.g., S2S grains in baking class, Juntos retreat, class visits, farmer EE with crop management/care). Most respondents ($n = 6$) also identified that they were planning to follow their original plans/goals, and all respondents ($n = 8$) identified that they could be supported by leadership facilitating EE communication and collaboration (e.g., facilitating collaboration across teams and with partners, such as interdisciplinary events with Viva Farms and partnerships with 4H, other extension branches, and other quinoa or wheat researchers, as well as dataset sharing and communication of updates on EE efforts and opportunities for involvement).

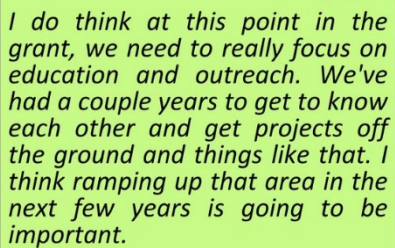
Dissemination

Respondents were asked for suggestions for how the project could enhance the effectiveness of dissemination efforts and make the information more accessible to diverse audiences. Respondents proposed specific strategies that leadership could use to improve dissemination and awareness, for example ($n = 6$):

- Build brand awareness.
- Collaborate more with the university and USDA.
- Include more project details in distributed materials.
- Provide content in different languages.
- Provide events like pop-up bakeries.
- Provide more interesting content on social media by focusing more on grains and whole-grain food products.
- Understand the audience better.

Sustainability (Feasibility) and Final Thoughts

Finally, respondents were asked for their perceptions of the feasibility of integrating new food products into community-based programs. While the majority ($n = 6$) said it was feasible to implement new foods, they said it will take more work to address barriers (e.g., relationship-building, need-building, scaling issues, understanding end-user needs). At least one individual identified that additional funding will also be helpful for long-term sustainability of the project efforts. Two respondents did not have the necessary involvement or knowledge to speak about the success of the project's efforts in this area.



I do think at this point in the grant, we need to really focus on education and outreach. We've had a couple years to get to know each other and get projects off the ground and things like that. I think ramping up that area in the next few years is going to be important.

Respondents' final thoughts and comments emphasized the need for the project to shift to a greater focus on EE at this stage (more collaborative events, a focus on effective marketing and dissemination, greater engagement; $n = 4$) and reiterated suggestions to improve communication and collaboration regarding EE (e.g., more interdisciplinary collaboration opportunities for EO, clarification of how Viva Farms is integrated in project, identification of EO opportunities team members are currently participating in, communication of EO opportunities team members could become involved in; $n = 3$).

OBSERVATIONS AND RECOMMENDATIONS

The following sections provide observations and recommendations based on the data analysis for project leadership to consider when making future project adjustments and plans.

Observations

The EE data collection was designed to provide evidence toward the fourth evaluation question: "To what extent have extension/outreach and education programs been successful in reaching target audiences and changing target audiences' knowledge, skills, attitudes, and/or behaviors?" (See the Comprehensive Evaluation Plan.) Results of the EE interviews demonstrate progress toward these project goals. Respondents were involved in a wide variety of EE activities and shared many highlights of their success and perceived impacts, particularly on students. In reflecting on the impacts of incorporating project materials into EE efforts, respondents identified that HS interns, undergraduate and graduate students, farmers, and the general population are being reached (only a few indicated industry targets). Consequently, these audiences are impacted by a greater awareness and knowledge of project concepts, tools, and techniques. Students in particular experienced growth in their professional development in addition to acquiring new knowledge and skills. EE activities supported students in aligning their skills with their interests, provided greater exposure to career opportunities, expanded their professional networks, and enhanced their transdisciplinary and diverse team skills and interests. Notably, most respondents said they felt the project is already diverse or that diversity is occurring naturally.

Most respondents incorporate project research or materials into their EE efforts or coursework and curricula, but the few who have not done so cited the lack of data or research results as their hurdle. Those implementing EE efforts mentioned three goals: 1) train the future generation of researchers, 2) identify barriers along the pipeline of integrating nutritious crops into the market stream, and 3) educate farmers on soil health and cropping system management. Barriers to these goals include a lack of organization and communication regarding EE activities, research-related challenges, and logistical challenges with HS students and internships.

Additionally, respondents discussed areas for improvement. In particular, all respondents ($n = 8$) indicated that at least some aspects of EE efforts were behind schedule for various reasons (waiting for results, COVID-19 or organizational delays, lack of farmers to implement research, equipment problems, other priorities, personnel changes, etc.). Respondents also indicated some scheduling and mentoring concerns with HS interns, especially those who may need extra support. Suggestions to address these areas included improving communication and streamlining and increasing student support. While respondents said they felt students in particular were positively impacted by EO efforts, there was little evidence of

impacts in practices, policy, or decision-making. As such, progress has been observed for short-term goals and impacts, but it is too early to make observations on long-term goals. Barriers to reaching the public included geographical distance and lack of communication across project teams, difficulty finding early adopters of new programs, and personnel or staffing limitations. Suggested improvements were to increase the publicity of the HS internship program and leverage existing relationships with partners to promote engagement.

Respondents indicated that they plan to continue with their EE plans and incorporate research results and materials more aggressively into their upcoming workshops, farmer EO, and classes. Similar to the aforementioned suggestions, they indicated they would appreciate support from leadership to achieve their goals, saying leadership should improve or facilitate communication and collaboration of EE efforts. Additionally, respondents suggested specific strategies to leadership that they could use to improve dissemination and awareness of project information (see Figure 6 for examples).

Figure 6. Respondents suggested several strategies for leadership to improve dissemination and awareness of project information.



Despite the barriers and hurdles, most respondents said they felt optimistic about the project’s feasibility and leadership’s ability to help address the barriers they have encountered, such as by improving communication, especially with those who are siloed in the project. They also suggested shifting to a greater focus on EE efforts at this point in the project.

Recommendations

OEIE suggests that foremost, leadership should continue supporting their EE team to build on successes they have already achieved. Such support includes helping organize or host events; distributing research materials among the team; facilitating communication and collaboration on EE activities across teams; promoting work using social media, emails, flyers, the website, and other modes of communication; and including EE in annual meetings. To improve on areas that respondents indicated, see the following summary table for suggestions.

Areas for Improvement	Suggestions and Recommendations
Potential discrepancies in goals and targets	Respondents indicated their goals are to 1) train the future generation of researchers, 2) identify barriers along the pipeline of integrating nutritious crops into the market stream, and 3) educate farmers on soil health and cropping system management. Yet not all groups (students, public/consumers, scientists/industry) are being reached evenly. OEIE suggests that leadership review the patterns of target types, targets reached and impacted, and the goals they identified in this report to determine if they align with the project EO goals. If they do not align, OEIE suggests leadership meet with the EE team and collaborate on adjusting strategies. For example, if leadership wants a greater emphasis on industry

	impacts, OEIE suggests leadership shift more materials toward the efforts by creating dissemination materials specific for industry and invite industry members to panels and meetings.
Need to improve or provide more effective communication	OEIE suggests considering the respondents' suggestions to continue and facilitate contact between team members, communicate the status of the HS internship, discuss knowledge gaps in ongoing research, and facilitate greater data sharing (such as through a data-sharing platform). This will address the feelings of some being siloed from other groups and the overall project and will help mitigate research-related challenges. Some respondents also indicated they wished to have more help, support, and guidance from leadership on their EE efforts (e.g., instruct them how to engage in EE efforts, provide materials, ask them what they need). Greater communication will help alleviate such issues.
Need to streamline or provide greater support for HS students	<p>Respondents identified several barriers with HS students that could be resolved or lessened through the following methods:</p> <ul style="list-style-type: none"> • Provide HS students with materials in advance. • Prepare, recruit, and find more appropriate mentors (those excited/wanting to work with students). • Pair interns to reduce mentoring burden. • Adjust the timing of the grading. • Encourage students regarding their capabilities so they are not fearful of courses. <p>Some also suggested holding the HS internship poster session at the annual meeting, which could help further awareness of the internship and engagement with the interns.</p>
Need to improve dissemination and awareness of project information	<p>It was suggested to leadership that they could improve dissemination and awareness of project information using the following strategies:</p> <p>Awareness:</p> <ul style="list-style-type: none"> • Collaborate more with the university and USDA on EO efforts. • Build brand awareness. • Hold events, such as pop-up bakeries. • Understand target audience(s). <p>Dissemination:</p> <ul style="list-style-type: none"> • Improve accessibility of content (e.g., provide it in different languages). • Include more project details in distributed materials. • Provide more interesting content on social media, such as more focus on grains and food photos.

AFRI SAS Soil to Society
Year 3 IP Interview (Education and Outreach) Interview Report
Appendix A – Interview Instruments

Background

1. Please describe your background and experience in education and outreach.
 - a. When and how did you first get involved with the S2S project?
 - b. What specific aspects of the project's research are you most familiar with, and how do they relate to your role in outreach and education?

Project Implementation

2. How do you integrate the project's research results into the outreach and education components? (Think of examples of successful integration and its impact on the target audience)
 - a. Please describe the outreach or education efforts you engage in.
 - b. What are the goals of your outreach and education efforts?
 - c. Who are the target audience(s) of your outreach or education efforts?
 - d. What impact have you observed the outreach or education components making on these audience(s)?
3. Do you consider your outreach or education efforts to be behind schedule, on schedule, or ahead of schedule?
 - a. Please describe why.
4. How have you implemented the lesson plans, experiments, and/or activities that you learned from the project?
 - a. To what extent do you implement the lesson plans, experiments, and/or activities?
 - b. Approximately how many students/target audiences do you think you've reached?
5. What are one or two major highlights from your application of project results and knowledge? (i.e., What is project doing well so far as it relates to outreach/education)
6. What are one or two key barriers/challenges of the S2S project's outreach/education efforts?
 - a. What suggestions (e.g., changes, new approaches) do you think would be helpful for eliminating/mitigating those barriers/challenges?

Impact

7. From your perspective, how (if at all) has your experience with the project's education and outreach efforts assisted you in inspiring the next generation in agriculture-related careers?
 - a. Among diverse and/or underrepresented minority students?
8. What suggestions do you have for the program to reach more diverse and/or underrepresented groups (URGs) (i.e., educators, students)?
9. From your perspective, what reported changes (if any) in agriculture practices, policy, or decision-making can be attributed to the project's research results? (Can you provide examples)
10. What barriers or challenges have you encountered in engaging with the community through education or outreach programs, and how have you addressed them?
11. Please describe your outreach or education plans for the remainder of the Soil to Society project cycle.

- a. Have your plans or programming changed from the outreach or education efforts originally proposed?
- b. What can project leadership do to support you in your outreach or education efforts?

Dissemination

12. What suggestions do you have to enhance the effectiveness of dissemination efforts and make the information more accessible to diverse audiences?

Sustainability

13. What are your perceptions regarding the feasibility of integrating new food products into community-based programs?

Final Comments

14. Please share any additional comments you may have about the implementation or impacts of the S2S project's education and outreach efforts.

**AFRI SAS Soil to Society Y3
Year 3 IP Interviews (Education and Extension) Interview Report
Appendix B– Compiled Results**

Note. This report uses the abbreviation EE for Education and Extension or EO for Education and Outreach, which are used interchangeably. Additionally, HS is used for high school (HS) and underrepresented (UR) groups (URG).

Background

Table 1. Please describe your background and experience in education and outreach. (n = 7)

Theme	Frequency
Professional (non-faculty) experience in EE (HS programs; extension specialist).	4
Education/Outreach experience within academia (e.g., as research/teaching faculty).	3
Participated in extension and outreach events (volunteer work; with farmers/growers).	2
Degree is in education and/or outreach (general, agricultural).	1

Note. Frequencies sum to greater than n because responses can be coded into multiple themes.

Table 1a. When and how did you first get involved with the S2S project? (n = 8)

Theme	Frequency
Involved in writing S2S grant proposal.	7
Had previously worked with project team.	3
Not involved in prior research with project team members.	1

Note. Frequencies sum to greater than n because responses can be coded into multiple themes.

Table 1b. What specific aspects of the project's research are you most familiar with, and how do they relate to your role in outreach and education? (n = 8)

Theme	Frequency
<i>Familiarity</i>	
Familiar with some aspects of the research (with own discipline, with food products, plant breeding, post-harvest studies; worked with Bread Lab and/or Viva Farms).	7
Project was an evolution of previous research.	2
Not Familiar (only hears aspects of research at annual meetings).	1
Research parallels work being done at Bread Lab.	1
<i>Role</i>	
Objective lead.	4
Not formally part of education team but participates in HS internship/curriculum.	2
Role is specifically EE.	2
Teaching undergraduate and graduate students.	2
USDA ARS partner.	1
Team scientist.	1

Note. Frequencies sum to greater than n because responses can be coded into multiple themes.

Project Implementation

Table 2. How do you integrate the project’s research results into the outreach and education components? (Think of examples of successful integration and its impact on the target audience) (n = 8)

Theme	Frequency
HS interns work directly on research-related projects (with research team).	3
Integrate project into coursework being taught (e.g., soil health and regenerative ag course; a “soil to society” course combining agronomy, food science, human nutrition, human health).	3
Integrate project research by training or talking about it with graduate students (e.g., incorporated into talks given by wheat quality lab).	3
Disseminates marketing material or project research (i.e., at pop-up bakeries, events).	2
Integrating project research into farmer outreach/education (e.g., via field days, EO events, grower publications).	2
Planning on more effort to integrate research results into existing workshops, courses.	2
Does not yet integrate project research into EO efforts (not far along enough or does not research results).	2

Note. Frequencies sum to greater than n because responses can be coded into multiple themes.

Representative quote(s):

- *I would say we have not yet. Partially because I don’t feel as familiar with the results. I’m aware that there’s research going on, but I haven’t been aware of what results there are yet.*
- *We’re integrating some of the findings or the data sets or we’re creating labs that might mimic something that our research team is doing so that they can struggle with the questions with some of the data we are finding in the process.*

Table 2a. Please describe the outreach or education efforts you engage in. (n = 8)

Theme	Frequency
Provide research experience and education for students (e.g., in the lab, summer jobs, engagement, general research, specific programs like USDA Sci in Action, Upward Bound, internships).	5
Farmer EO (e.g., via extension field days, Growers Association, farmer training, practicums, meetings about new crop varieties, about issues they experience, etc.).	3
Public farm-to-consumer activities and education (e.g., Buckwheat festival, direct consumer EO).	3
S2S EO efforts through media (e.g., Instagram, podcasts, newsletters).	3
Development of curriculum for HS teachers and course for interns.	2
Marketing outreach to industry beginning to focus on crop nutrition as well as functionality in food processing chains.	1
Recruit students interested in biology or agriculture.	1

Note. Frequencies sum to greater than n because responses can be coded into multiple themes.

Representative quote(s):

- *I do some popular press articles every year. It goes out primarily to the Pacific Northwest. Every year we’re asked to put together a two-to-three-page small focus on our research.*
- *In terms of outreach, right now all the marketing with wheat is still really focused on its functionality in food processing chains, typical food processing chains like bread baking and cookie baking, snacks, things like that. And so we’re just at the point where we’re introducing the concept of nutrition into those other traits.*

- *What we're working on currently, in addition to the project, is writing curriculum.... we will be working more closely to interview participants or researchers, research teams, and then using some of the data or clean sets of mimicking data from projects to integrate into the curriculum for the students.*

Table 2b. What are the goals of your outreach and education efforts? (n = 7)

Theme	Frequency
To train the future generation of agricultural researchers (i.e., build greater diversity, skills, knowledge, learn principles of grains/food processing, and how to learn, foster interest, and expose students to transdisciplinary experiences).	5
Identify barriers along the pipeline of integrating nutritious crops into the market stream (e.g., understanding consumer literacy; barriers to develop crops, to releasing crops, to getting adopted into market stream, to crops being used in the way envisioned).	4
Educate farmers on soil health and cropping systems management options.	3
Has disseminated some information but would like guidance/support.	1

Note. Frequencies sum to greater than n because responses can be coded into multiple themes.

Representative quote(s):

- *It's two-fold, or three-fold. One is for the student and education side; it's training graduate students or undergraduate students to be future leaders in agricultural research....even if they don't go into that realm, just increasing their knowledge of the complexity of the system so they can hopefully make impact in whatever realm they choose to work in the future... For the high school internship program, just getting more students interested in soil and food and agriculture and science, and particularly, if we can increase the diversity of students that are interested in this realm of work... And then, on the farmer side, making farmers more aware of what soil health is and how to manage it, and increasing their toolbox in managing their cropping systems...a goal is to then make sure that information is delivered to the people that might use it.*
- *Once there's additional education outreach components, I'd say our goal is to build agricultural literacy and an understanding from folks of where food comes and how to promote both a healthy food system and healthy ecosystems.*

Table 2c. Who are the target audience(s) of your outreach or education efforts? (n = 8)

Theme	Frequency
Members of the public/consumers (i.e., generally, those interested in food/agricultural production, all ages, mom and pop stores).	6
HS students (prospective interns, Title I students).	5
Graduate and/or UG students (i.e., generally, from URM groups, outside of the project).	4
Growers/producers (and those who are URM).	3
Food processing industry/supply chain and scientists.	2

Note. Frequencies sum to greater than n because responses can be coded into multiple themes.

Representative quote(s):

- *From the education outreach perspective, I'd say it generally targets folks who are interested in understanding more about where their food comes from and what agricultural production looks like, which is more and more a bigger swath of society that is interested in that, in making those connections.*
- *In addition to the students, these are public. These are mom and pop workshops and so food processor scientists/industry.*

Table 2d. What impact have you observed the outreach or education components making on these audience(s)? (n = 8)

Theme	Frequency
General student gains (e.g., in knowledge, plant breeding, career interest, confidence, obtaining internships and jobs).	4
Graduate student gains (job offers, gains in knowledge, supervisory experience, support networks and co-learning, interdisciplinary collaboration).	3
Producer new knowledge and implementation/application (e.g., increased awareness of crop rotation options and soil management practices, development of new products, increased efficiency of existing products).	3
HS student excitement and gains (i.e., positive experience, building career/ed pathways).	2
Developing outreach to counteract dietary/nutrition misinformation (e.g., fads, anti-gluten, anti-GMO) and educate on nutritional possibilities.	1
No broader impact or only anecdotal on general public/consumers yet.	4

Note. Frequencies sum to greater than n because responses can be coded into multiple themes.

Representative quote(s):

- *The summer interns have definitely grown in their confidence a lot and they are really excited about science, but I would say now they're seeing how their excitement about science can be applied within the fields of agriculture, food science, and health science. So, it's been fun getting them to see how they're seeing an opportunity for themselves in the future connected to the work that we're doing in the grant research.*
- *We see students stay and want to work in labs and they are getting internships increasingly over the years.*

Table 3. Do you consider your outreach or education efforts to be behind schedule, on schedule, or ahead of schedule? (n = 8)

Theme	Frequency
Ahead of Schedule	
Education efforts ahead of schedule (e.g., already graduating, teaching courses from get-go).	1
On Schedule	
Efforts are on schedule.	5
Behind Schedule due to:	
Waiting on research result(s).	2
COVID delays.	1
Current lack of target audience among farmers (e.g., those ready to do grain crop rotations)	1
Delays in assignment of HS interns	1
Equipment problems	1
Organizational delays from interdisciplinary nature of project	1
Other priorities taking precedent	1
Personnel changes (e.g., turnover, retirement of key staff)	1
Does not engage in S2S EO efforts	1

Note. Frequencies sum to greater than n because responses can be coded into multiple themes.

Representative quote(s):

- *Considering that a masters student has already graduated and so that's another aspect of education that is at least on schedule, if not ahead of schedule.*

- *For the extension I'm involved with, we need this processing data and applications/processing data, so in the next two years we will do a lot more. I don't know whether that is on or off schedule but probably getting to the point where we are slightly off schedule. By this time, I was hoping we'd have more data.*

Table 4-4a. How have you implemented the lesson plans, experiments, and/or activities that you learned from the project? (To what extent do you implement the lesson plans, experiments, and/or activities?) (n = 7)

Theme	Frequency
Integrates at least some aspect of project research, materials, and concepts into courses/curricula (HS, undergrad, and grad level).	3
Project data, activities, etc. is integrated into extension activities (e.g., workshops, field days).	3
Discusses project/grant but would like more concrete implementation of project findings (e.g., through a course).	1
HS internship activities (experiments, poster session, etc.) occur in real time with research team.	1
Does not implement S2S lesson plans, activities, or experiments in outreach efforts.	1

Note. Frequencies sum to greater than n because responses can be coded into multiple themes.

Representative quote(s):

- *I don't think that really applies yet. I think once we execute on these workshops, we'll have a better answer to that. But so far, not so much, beyond the one-on-one technical assistance, which I've learned through the project, but it's not exactly like a lesson plan or anything, it's just awareness.*
- *The data we get we utilize it...for example, with buckwheat, we can replace 25% of wheat with buckwheat and still make a good bread and 100% of flour with buckwheat to make a good pancake...we translate that directly into an extension activity. So, research and publications get translated directly into activities and we include figures from the publications and such.*
- *Well, the class is on writing, technical writing, for graduate students. So, I do have them talking to each other and we have some students in the class who are funded off this project...They've been talking to each other about the project and what it's all about. That's about the extent that I've implemented it in my class itself. I basically take whatever they're working on and we work off that.*

Table 4b. Approximately how many students/target audiences do you think you've reached? (n = 8)

Theme	Frequency
General Public	
Several thousand of the general public via podcast	1
Farmers/Growers	
75 growers/ag support providers at field days	1
40-60 growers/ag support/farm-to-school people (at Buckwheat Fest, at field days, workshops, 1-on-1s)	3
10-20 farmers through intensive 1-on-1	1
Graduate Students	
21-30 graduate students through the regenerative ag class	1
10-20 graduate students (e.g., through internships, direct lab work)	2
5 or less graduate students (e.g., through direct project work)	2
Undergraduate Students	
5 or less Undergrads	1
Highschool Students	
10-20 interns	1
5 or less interns	4

Theme	Frequency
<i>En Mass</i>	
Hundreds of students and public a year	1

Note. Frequencies sum to greater than n because responses can be coded into multiple themes.

Representative quote(s):

- *At our field day last year, there were probably about 75 people and that included some farmers and also, what would you call them, technical support providers, like conservation districts, agronomists - people that worked with farmers.*
- *We had five students last year. We have the potential for five or six students this year.*

Table 5. What are one or two major highlights from your application of project results and knowledge? (i.e., What is project doing well so far as it relates to outreach/education) (n = 8)

Theme	Frequency
Develop HS student skills, interest, and exposure to career options (generally, presentations, inclusion in publications, research involvement).	3
Engaging with students (e.g., educating on nutrition, getting their feedback, aligning their interests/skills with research).	2
Research discoveries and progress (e.g., issues with low levels of zinc in soil, generating seeds for other objectives to use).	2
Agronomy field visits.	1
Baking, selling, and teaching about approachable whole grains (e.g., the approachable loaf; pop ups to sell grains to community).	1
Effective dissemination of project information (e.g., via blog posts, social media).	1
Incorporating project research in teaching regenerative ag classes (e.g., considering health-oriented food systems from both environmental and community levels).	1
Observing integration and adaptation of research into other areas (i.e., growing crops from Bread Lab seeds; graduation of young farmers and adopted ag practices).	1
Recruitment of high-quality interns.	1
Cannot speak to general project highlights (siloes from overall project progress).	1

Note. Frequencies sum to greater than n because responses can be coded into multiple themes.

Representative quote(s):

- *One of the really exciting things that came out of last summer's interns is that one of our high school interns was working on a publication with their research team.*
- *One part that I'm not fully updated on is the outreach and extension in agronomy. I think they've been doing field visits.*
- *They're growing a Skagit 1109 wheat this year, which is a wheat that they're going to be able to grow, process, and move here locally. So, I think just our contribution to encouraging and supporting that is gratifying and is a highlight. Like, wow, we actually have a commercially viable farm who's adopted these practices, growing some of these crops, and they're young.*

Table 6. What are one or two key barriers/challenges of the S2S project's outreach/education efforts? (n = 8)

Theme	Frequency
Missed opportunities due to lack of organization or communication (e.g., no contact from leadership about involvement in S2S EO; teams too siloes for interdisciplinary collaboration; general lack of communication from EO team).	4
Research related challenges (e.g., soil quality, climate impacts; research is inherently very slow, acquiring data from teams, adapting to new evidence like Zinc).	3

Theme	Frequency
Challenges with HS students/internships (scheduling, some students need more support, need more enthusiastic and prepared mentors, time consuming, recruiting in remote areas, delayed program start).	2
Mismatch between scale of farming operations (e.g., Farmers do not have enough acreage for grain crop rotations; market pressure).	1
Some graduate students are reluctant to take an interdisciplinary course (worried they will perform poorly).	1
Not very involved in overall project since the first annual meeting.	1

Note. Frequencies sum to greater than n because responses can be coded into multiple themes.

Representative quote(s):

- *Getting team members who are excited and feel confident about working with high schoolers, that's definitely out of some people's comfort zones. So, letting them get used to that idea, being able to prepare them with materials or support or mentorship from RN, so that they feel confident working with those high school students.*
- *I feel like no one said to me, "Hey, let's do outreach about SAS" and I feel like, oh, maybe you and I have been doing it all along, but then again, I had to reach out and get the collateral materials. So, I feel like a barrier is actual organization.*

Table 6a. What suggestions (e.g., changes, new approaches) do you think would be helpful for eliminating/mitigating those barriers/challenges? (n = 8)

Theme	Frequency
More effective communication (e.g., continue/attempt contact with relevant team members, communication from EO team on status of internship, discuss knowledge gaps in ongoing research, more opportunities for interdisciplinary interaction, data sharing/communication at annual/general meetings, create data sharing platform).	7
Streamline/increase support for students, esp. HS interns (e.g., provide materials in advance, prepare/recruit appropriate mentors, pair HS interns to reduce mentoring burden, adjust timing of grading, assure students they are capable of transdisciplinary classes, hold HS internship poster session at annual meeting).	4
Develop key takeaways/deliverables that present research outcomes, even when research is ongoing.	1

Note. Frequencies sum to greater than n because responses can be coded into multiple themes.

Representative quote(s):

- *I'd like to have a few more opportunities to interact. We're formed into these different groups, like the breeding group, the agronomy group, the food science group, and the medical science group. That makes sense from a science perspective, but to really make the project go, we have to have more opportunities to interact with each other. We do it now twice a year formally, but I think we're going to have to form into some teams that go across these disciplines going forward.*
- *Last year, we met with mentors, but it ended up being more of the researchers on the team. Then in reality, the graduate students under those researchers were the ones that were doing more of the mentoring with the high school students. So, this year, we want to make sure that when we meet with our mentors that we're meeting people who will definitely be working one-on-one with those students on a regular basis.*
- *We can set up one file somewhere on the cloud where ALL the people doing agronomy can go online and put in what they got this year from their harvest. If they can write that up, we can go to that spot so we can say 'oh someone has this so we can call them and ask for it'.*

Impact

Table 7. From your perspective, how (if at all) has your experience with the project's education and outreach efforts assisted you in inspiring the next generation in agriculture-related careers? (n = 8)

Theme	Frequency
Professional development of students (e.g., mentorship skills, aligns skills with interests and life applications, career exposure, professional network expansion, transdisciplinary/diverse team skills and interest).	6
Students learn research fundamentals (e.g., understanding what is not working, how to improve taste and nutrition of product; how to engage in transdisciplinary research).	4
New interdisciplinary food systems/human nutrition major (may bring opportunities to engage HS and undergraduate students interested/involved in project research; students will get aspects of dietary nutrition, human food science, plant science, animal science).	2
Expose aspiring farmers and farmer trainers to broad range of different agricultural career options (e.g., farming, research, academia, farmer support industries).	1

Note. Frequencies sum to greater than n because responses can be coded into multiple themes.

Representative quote(s):

- *For graduate students it's understanding the fundamentals (i.e., when you make a whole grain food product, it doesn't taste good at least for the market, so we can figure out why it doesn't taste good and how to make it taste better). It's not about just taking the seeds to put into a food product and seeing what happens, it's about understanding what is not working and how to improve so they can make something tasty and nutritious.*
- *Some students went into the food industry. At least what I know is that they have received some (maybe even significant in some cases) education on human nutrition and human health aspects, which they have been able to use to their benefit. So, they have been able to get into industry positions that probably they wouldn't have been able to get into or even more traditional food science education. So, I'm pretty sure that has opened doors to more collaborative and interdisciplinary R&D positions with different industries.*

Table 7a. Among diverse and/or underrepresented minority students? (n = 3)

Theme	Frequency
Applicants are already diverse so having desire to learn more important in selection process.	1
Observed that participating in project has inspired UR students.	1
UR students are participating but can't speak to how the experience is inspiring them.	2

Note. Frequencies sum to greater than n because responses can be coded into multiple themes.

Representative quote(s):

- *I would say there's definitely participation by underrepresented groups. I think that we're reaching underrepresented groups, but I can't necessarily speak to their experience in terms of how it's impacted them.*
- *We are in a society where we don't discriminate, there are rules around it... I see all kinds of people come into the program and we don't even try to pick out diversity. We see all kinds of gender and all kinds of diversity in the program. It's more about do they have the desire to learn and we go with that.*

Table 8. What suggestions do you have for the program to reach more diverse and/or underrepresented groups (URGs) (i.e., educators, students)? (n = 8)

Theme	Frequency
Expand EO efforts in schools (e.g., talk about and show different grains; bilingual efforts, in other countries).	3

Theme	Frequency
Collaborate/connect with existing education efforts (e.g., Bread Lab, Viva Farm education efforts).	2
Identify gaps in diversity to refine recruitment (e.g., among team members/students, disciplinary gaps, accessibility and affordability of internships and other opportunities, etc.).	2
Invest in developing meaningful relationships with UR people/communities (directly or via ally organizations with established relationships; foster synergy between URGs, consider other EO efforts outside of publications; host field days).	2
Showcase accomplishments of diverse research team/students.	1
Already have UR representation (work with UR folks daily).	5

Note. Frequencies sum to greater than n because responses can be coded into multiple themes.

Representative quote(s):

- *Early outreach, trying to get as big a pool of applicants as possible.*
- *Thinking about the challenges in terms of participating, what is feasible, what is not, and then what pools you are drawing from. So, if it's reaching high school students in Pullman and you're drawing from Pullman, obviously you're limited to the demographics of Pullman. If you're drawing from Tri-Cities or somewhere like that, that's going to be a very different demographic audience... So, I think thinking about where those internship opportunities are and then what demographic populations you're drawing from, but then also how do you make those feasible and feasible across income brackets.*

Table 9. From your perspective, what reported changes (if any) in agriculture practices, policy, or decision-making can be attributed to the project's research results? (Can you provide examples) (n = 8)

Theme	Frequency
Makes it possible to implement changes related to more nutritious product replacements.	3
Project has led to gains in knowledge and awareness (e.g., generally, in industry, in legislature; companies interested in Quinoa cookies, mills interested in demonstrating the sustainability of their supply chains).	3
More nutritious school lunch programs will have a big impact.	2
Too early or not able to answer whether the project has will lead to changes in practices, policy, or decision-making.	6

Note. Frequencies sum to greater than n because responses can be coded into multiple themes.

Representative quote(s):

- *I don't know if I'm going to have a great answer for this yet.*
- *Recently, we've been contacted by some players in the grain supply chain asking questions about how they can show, demonstrate, or determine whether their supply chains are getting their grain are from sources that are sustainable or regenerative.*

Table 10. What barriers or challenges have you encountered in engaging with the community through education or outreach programs, and how have you addressed them? (n = 8)

Theme	Frequency
<i>Barriers</i>	
Physical location can be a barrier (e.g., too far to engage in EO, for HS recruitment, too far for word of mouth from peers, more difficult to access some locations).	3
Communication when working across project teams (e.g., different research areas, different/accessible languages; knowing who and what to engage in EO).	2
Finding early adopters of new programs (e.g., internship, curriculum, farming practices) is challenging (e.g., time, space, scheduling, interest, availability)	2

Theme	Frequency
Personnel/staffing limitations (e.g., lack of staff, turnover)	2
Level of excitement/engagement from broader team (barrier to engaging them in EO)	1
Misinformation in nutrition (e.g., generally, mistrust of scientists)	1
None yet (may encounter in the future, i.e., when trying to engage grain producers and processors)	3
Mitigation	
Increase publicity of HS internship (i.e., presentations at events, personally recruit/market internship at schools, showcase projects and benefits).	1
Leverage existing relationships with partners to promote engagement	1

Note. Frequencies sum to greater than n because responses can be coded into multiple themes.

Representative quote(s):

- *I guess a barrier for the internship program has been maybe communication to some degree. We don't necessarily get the opportunity to communicate with those interns until [it starts], and so we have that kind of intermediary. So, if that communication between us and the intermediary isn't happening, then we're not having the communication with the prospective students or the interns.*
- *Specifically with this internship experience, we'll see the same thing when we try to push out the curriculum – it is finding people who are willing to try it for the first time and build the interest and get those connections.*

Table 11. Please describe your outreach or education plans for the remainder of the Soil to Society project cycle. (n = 8)

Theme	Frequency
Incorporating S2S in upcoming workshops, farmer EO, and classes (i.e., S2S grains in baking class; Juntos 3-day retreat educating kids and families on ag related career options; class visits; farmer EO with crop management/care, esp. in collaboration with Bread Lab).	7
Continue and/or expand HS internship (e.g., expand to Spokane, Hopkins).	3
Development of new interdisciplinary undergraduate major/classes with College of Ag.	1
HS curriculum training (e.g., prof training in-person, online) and deployment.	1
Implementation of EO efforts will depend on outcome of workshops (e.g., may be more workshops, 1-on-1 technical assistance, or grain production demonstrations)	1
Would like to collaborate with other project groups on farmer EO (e.g., Viva Farms).	1
Don't know (No one has approached them about engaging in S2S EO efforts).	1

Note. Frequencies sum to greater than n because responses can be coded into multiple themes.

Representative quote(s):

- *I feel like there should be a part where I'm in it, but I just don't think anybody's really approached me about that. But I feel like they should, or maybe I'm missing out on something.*
- *We'll continue to participate in the internship program.*
- *We're kind of currently at the stage of testing whether that's true and are there certain varieties that do better or worse for certain outcomes, if they're managed in a certain way, does it maximize those benefits? So, I think, right now we're kind of in getting that information staged. And then, a goal is to then make sure that information is delivered to the people that might use it.*

Table 11a. Have your plans or programming changed from the outreach or education efforts originally proposed? (n = 7)

Theme	Frequency
Still planning for original plan/goal (or no major changes).	6

Theme	Frequency
Disseminate findings/results through alternative methods (social media, web platforms, writing for the public).	1
Interdisciplinary course development.	1
Must adjust via extension to accommodate for declining extension funding (e.g., meet individually with personnel from different aspects of extension services).	1

Note. Frequencies sum to greater than n because responses can be coded into multiple themes.

Representative quote(s):

- *We are planning this season to offer a series of two workshops looking at how the growth of these crops, the cultivation of these crops by farmers, could play a role in their overall cropping systems and all of the specifics around what it takes from a production standpoint, how to grow these, and all the way through post-harvest management, marketing, and all the requirements of the different crops.*
- *We will be doing some in-person training, but the original goal and what I hope we can still do is creating an online curriculum training piece where, if they're not somewhere where we're doing it in person, that they could just take that curriculum professional development piece online self-paced through Canvas or something and then be confident to implement it.*

Table 11b. What can project leadership do to support you in your outreach or education efforts? (n = 8)

Theme	Frequency
Facilitating communication and collaboration (e.g., cross-team, with partners, from leadership on EO efforts, team up to put on events with Viva Farms, with quinoa or wheat researchers, with 4H and other extension, sharing datasets, give students birds eye view).	8
Advertise interdisciplinary course to their own students.	1
Encourage team to participate in EO activities (e.g., recording EO pieces in the lab).	1

Note. Frequencies sum to greater than n because responses can be coded into multiple themes.

Representative quote(s):

- *From the management to say, "Hey, what are you doing?" I do feel like it would be a big deal to do outreach and education about a big cool grant that we're doing, but no one has ever approached me about that. Not even once.*
- *The only thing would be, and I don't know how you do this, but more integration between partners; some way to share what results are, what research is coming out, just in general. And I think Ali's doing a great job, and so yeah, that would be my only recommendation.*
- *What we should do is talk to the people who are in charge of 4-H and really make sure they understand what we're doing. And that would be a pretty easy thing to do that I don't think we've done yet. And 4-H is just [one example], there's other examples, but I do know that we have a good strong 4-H program here.*

Dissemination

Table 12. What suggestions do you have to enhance the effectiveness of dissemination efforts and make the information more accessible to diverse audiences? (n = 8)

Theme	Frequency
Strategies to improve dissemination (accessibility, more interesting content on social media, such as more focus on grains/food photos, provide content in different languages; include more project details in distributed materials) and awareness (events like pop-up bakeries; build brand awareness; understand audience; collaborate more with university and USDA).	6
More time spent in direct community engagement efforts (e.g., tabling, stronger HS teacher training).	2

Theme	Frequency
Collect data on EO effort impact (e.g., student interest in career fields, science concepts)	1
Create a simple HS internship related to non-agricultural project research (due to difficulty explaining research).	1
Engage with governmental policy-makers.	1
Cannot make suggestions (not familiar with project dissemination efforts).	1

Note. Frequencies sum to greater than n because responses can be coded into multiple themes.

Representative quote(s):

- *I think I would probably do pop-up bakeries if I were them or something where you're actually making the things you have and you're bringing it to the populations, I suppose. But I think I would start with social media and the website. I would start with that, letting people know what's happening. But you have to get out into communities where they are. I'm just not sure about the manpower for that, but just explain what's happening.*
- *We have a good team of people in USDA who are in charge of promoting our research. I didn't know we had these people until just about two months ago. So, working more with them when we publish a paper, talking to them and trying to figure out what's the angle on this paper that we really want to get out. And then they have the expertise to get it into the media in a way that is beyond what I know how to do. They can write it in a way that's more accessible or things like that. So I'd like to do more of that. And the universities also have people who can help us with our messaging.*

Sustainability

Table 13. What are your perceptions regarding the feasibility of integrating new food products into community-based programs? (n = 8)

Theme	Frequency
Feasible	
Can implement new food products but will take work to address barriers (e.g., time, creativity, relationship-building, need-building, scaling issues, understanding end-user needs).	6
Diverse crops grown in region support diversity of human foods/nutrition.	1
Feasible, but additional funding will be helpful for long-term sustainability.	1
Feasible to integrate new products into community-based programs (and ensuring they know where the new product originates will support further dissemination).	1
Project has a strong base of integrated research departments/teams (will also support sustainability).	1
Unsure of feasibility	
Unsure how successful integration is of new food products (not involved in that side of project; can't say).	2

Note. Frequencies sum to greater than n because responses can be coded into multiple themes.

Representative quote(s):

- *I think there's a lot of potential...like anything, you have to start with understanding the current foods...what kind of role they're fulfilling, the criteria for acceptability, and then working off those. It's not necessarily that people are just resistant to integrating certain things on principle, whether that's more whole grains or more legumes, pulses. It's just understanding what the limitations of those are, whether that's cooking time or whatever, and then making sure that your products or what you're trying to integrate address those limitations.*

- *Yeah, I mean I think it's feasible. I think it's going to take time. I think it's going to take creativity and I think it's going to take building the relationship knowledge base, the want, and the need behind it. So, in some places, you will just have to convince the decision-maker. In other places, you're going to have to convince the consumer more, depending on what that community is.*

Final Comments

Table 14. Please share any additional comments you may have about the implementation or impacts of the S2S project's education and outreach efforts. (n = 6)

Theme	Frequency
Important to focus on EO at this point (more collaborative events, focus on effective marketing and dissemination; greater engagement).	4
More communication and collaboration (interdisciplinary collaboration opportunities for EO, clarify how Viva Farms is integrated in project, identify EO opportunities in which team members are currently participating and in which team members could become involved).	3
EO experience has been largely positive.	1

Note. Frequencies sum to greater than n because responses can be coded into multiple themes.

Representative quote(s):

- *I do think at this point in the grant, we need to really focus on education and outreach. We've had a couple years to get to know each other and to get projects off the ground and things like that. I think ramping up that area in the next few years is going to be important.*
- *In the last couple of years, really thinking about any events that we need to organize, doing that collaboratively rather than in silos so that it's more successful.*