

II. Academic Program Review Dossier Cover Page | 2023 Cycle

Name, Lived Name:	Sarah Light
Preferred Pronoun:	she/her
Academic Title:	Assistant Cooperative Extension Advisor
County/Program:	Sutter-Yuba and Colusa Counties/Agronomy Advisor
Review Type:	Multiple Actions <ul style="list-style-type: none">• Promotion (Assistant to Associate)• Accelerated Promotion (to Associate II, skipping Associate I)• Term Review Seeking Indefinite Status
Current Rank/Step:	Assistant Advisor IV
Requested Rank/Step:	Associate Advisor II
Review Time Period:	Accelerated Promotion: October 1 st , 2020 to September 30 th , 2022 Promotion and Term Review Seeking Indefinite Status: July 5 th , 2017 to September 30 th , 2022
Thematic Areas:	Theme 1: Improved Soil Management Theme 2: Improved Agronomic Production

Position Description
Sarah Light
Area CE Advisor – Agronomy – Sutter, Yuba, and Colusa Counties
Effective Date: July 5, 2017

PURPOSE & CLIENTELE

The Area Cooperative Extension (CE) Agronomy Advisor will develop and implement a multi-county based extension and applied research program with a focus on optimizing agronomic field crop systems (excluding rice) in Sutter, Yuba, and Colusa Counties (headquartered in Yuba City, CA).

The CE advisor will provide leadership for field research and/or educational programs as appropriate for commodities which include wheat, sunflower, and dry beans. Program may also include field research and/or education for additional crops including alfalfa, corn, and other field crops as needed. CE advisor will respond to clientele calls related to any relevant crops.

CE advisor will generate, collect, and disseminate relevant and up-to-date information that will improve and maximize field crop production while conserving natural resources and protecting the environment. The general focus of agronomic work will be interdisciplinary and may include plant nutrition, irrigation management, water quality, soils, pest management (weeds, insects, and diseases), marketing and economics. The CE advisor will facilitate interactions and collaborations with other UC academic staff, including CE specialists, UC faculty, industry groups, and public agencies.

Key clientele will include growers and pest control advisers. Other clientele may include commodity groups, closely related industry partners, irrigation districts, conservation/environmental groups, public agencies, and consumers.

ACADEMIC PROGRAM MAJOR RESPONSIBILITIES

- Conduct and report regular needs assessments to identify priority issues or problems relevant to the local clientele groups being served.

- Develop and implement effective UC ANR Cooperative Extension applied research and educational programs to address the identified priority needs of the clientele that are consistent with ANR's Strategic Vision.
 - Conduct applied research designed to monitor changes and solve locally relevant problems.
 - Disseminate useful, science-based information to inform clientele, using extension methods that are responsive to clientele needs and appropriate for the audience and situation.
 - Maintain and promote Cooperative Extension's credibility by providing science-based knowledge and skills independent of personal or parochial interests.
 - Evaluate programs and report accomplishments, results, and potential or actual impacts to scientific and lay audiences.
 - Develop collaborative teams with other UC ANR academics, campus-based specialists and faculty and/or others, to address priority issues for UC ANR.

- Participate in professional organizations and collaborate with federal, state and county governmental agencies, non-government organizations and others by providing independent science-based information and leadership.
- Foster an increased understanding of Cooperative Extension's research and education programs in clientele, the public and policy makers.
- Maintain a program of continuous self-improvement by participating in in-service training, seminars, workshops, work group & program team meetings, short courses, professional society meetings and other relevant opportunities.
- Participate in UC and ANR leadership, through work groups & program teams, committees, task forces and other formal or informal structures.
- Serve the California public by participating in activities of public agencies and organizations.
- Actively advocate for UC ANR program awareness and support.

PROGRAM LEADERSHIP AND BUSINESS OPERATIONS DUTIES

- *Leadership:* Provide vision, inspire, and motivate others with attitude and actions; sets a high standard for excellence; innovate and foster positive change; model and support a good team working environment; and encourage and is open to exploring new ideas and innovative changes, and provide active, ongoing advocacy and support for ANR programs.
- *Local Delivery of Statewide Programs:* Represents UCCE programs locally in professional manner; ensures clientele needs are assessed, supports the development of priority program goals to successfully meet clientele needs, in alignment with ANR's statewide Strategic Vision and initiatives; oversees delivery of UC ANR statewide programs at the local level; works with staff to ensure that outcomes and impacts are measured and communicated; and interacts with UC ANR Program Teams, specialists and others within the research/extension network to develop, strengthen and expand the local delivery of statewide programs.
- *Interpersonal Relationships:* Is an effective listener and communicator; takes responsibility for his/her own actions; motivates others; keeps commitments; and cultivates political and industry support for UC ANR.

AFFIRMATIVE ACTION

- Comply with all applicable federal and state laws and regulations, and all University policies regarding affirmative action, including prohibition of discrimination on the basis of race, color, national origin, religion, sex, sexual orientation, physical or mental disability, age, veteran status, medical condition, ancestry or marital status.
- Promote, in all ways consistent with other responsibilities of the position, accomplishment of the affirmative action goals established by UC ANR.
- Develop a statement of program mission and definition of potential program clientele that embody a commitment to serve diverse ethnic and gender groups.
- Plan and conduct programs in such a manner as to provide equitable service to all ethnic and gender groups that comprise the potential clientele population for the program.
- Identify any barriers to clientele participation related to ethnicity, gender, or other characteristic of concern under the University's affirmative action policies, and take corrective action as needed to remove such barriers.
- Collect, and keep current, demographic data identifying the ethnic and gender distribution of the potential clientele populations for the program, and describing other characteristics of the population relevant to the pursuit of the Division's affirmative action goals.

- Compile and maintain documentation of service to each ethnic and gender group within the clientele population served by the program, including statistical records of clientele contacts, quantitative evaluations of benefits realized by clientele, and reports of any special efforts to serve under-represented groups.

RELATIONSHIPS

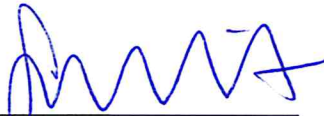
Responsible administratively to the UCCE Sutter-Yuba County Director for the conduct of the UC ANR program(s), with input from the UCCE Colusa County Director.

QUALIFICATIONS

A Master’s Degree in disciplines such as plant sciences, agronomy, crop science, pest management or other related fields is required. Excellent written, oral and interpersonal communication skills are required. A demonstrated ability in applied agricultural research and extension is preferred.

- Must demonstrate:
 - The ability to communicate and extend technical information in an understandable manner.
 - Knowledge of human relations is required including the ability to work with people with a diversity of views and values, to motivate people and adapt to changing situations.
 - Literacy in internet communications and with software to support research and education programs.

The CE advisor must possess or obtain a Qualified Pesticide Applicator Certificate (QAC) or License prior to applying or supervising the application of any pesticide.



 Sarah Light, CE Advisor

12/15/17

 Date



 Janine Hasey, County Director



 Christopher A. Greer

Digitally signed by Christopher A. Greer
 DN: cn=Christopher A. Greer,
 o=University of California, ou=ANR,
 email=cagreer@ucanr.edu, c=US
 Date: 2017.12.15 14:54:18 -08'00'

Chris Greer, Vice Provost
 of Cooperative Extension

12/27/17

 Date

12/15/2017

 Date

ACCELERATION STATEMENT

Accelerated Promotion with Indefinite (Assistant IV to Associate II) – Agronomy Advisor
Period of Review: October 1, 2020 to September 30th, 2022

I have had much success in building my program beyond what is expected of an advisor at my rank and step this cycle. The attached tables and program summary highlight my exceptional achievement in **Applied Research and Creative Activity/Extending Knowledge**. I successfully provided both virtual and in-person programming to meet clientele need. While I maintained a program focused on agronomy, I demonstrated great leadership and accomplishment with my work in cover crop management that has received recognition beyond the state. I have also made contributions beyond the expectations of my rank and title in **Professional Competence**, and **University and Public Service**. In the last 2 years:

Applied Research and Creative Activity:

- 6 peer reviewed journal articles, 5 in scholarly journals.
- I am a collaborator, PI, or co-PI on 21 total projects. Newly projects funded in last two years total over \$2.5 million, with \$271,398 specifically allocated to my program.
- I am leading the development of a Cover Crop Selection Tool for the Western Cover Crops Council (WCCC). This USDA funded collaboration engages experts in 13 states.
- Published new Cost of Production Study for Winter Cover Cropping in an Annual Rotation.
- Co-PI on statewide Needs Assessment with Agronomy Program Team.

Extending Knowledge

- Extended knowledge on Youtube - Soil Health Connection (19 new episodes, 3 in Spanish)
- 23 extension presentations (12 Virtual and 11 in person) with over 1,500 total attendees.
- Organized/Co-organized 18 extension events (8 virtual and 10 in-person).
- Co-organized the first livestock-crop integration in annual cropping systems focus group for farmers and ranchers in the Sacramento Valley. A workgroup formed as a result of this effort.
- Lead organizer on first WCCC event in the Southwest. Day-long tour with 45 attendees.
- 45 new popular press articles, including 7 trade journal articles and 11 technical reports.
- Was interviewed or featured 45 times on a variety of press platforms.

Professional Competence:

- Board membership: Western Cover Crops Council (WCCC)—joined 2019; WCCC Southwest Regional Committee (chair since 2020); Agronomy Society of America—CA Chapter (joined 2021).
- 5 presentations at professional society meetings (4 oral, 1 poster). Co-author on 13 abstracts.
- Continue to serve as co-Associate Editor of Agronomy Science for UCANR Publications.
- Received the Conservation Education Award for 2021 from the Soil and Water Conservation Society—CA and NV Chapter. Co-recipient with the Colusa Resource Conservation District for our Youtube Channel and extending soil health knowledge during the pandemic.

University and Public Service:

- Served on 8 search committees (chaired 1 academic and 2 staff searches).
- Serve as co-chair of the Agronomy Program Team since May 2022. Serve on Endemic and Invasive Pests and Diseases SI Panel since February 2022.
- Mentored 1 undergraduate fellow and 1 grad student. Participated in ANR mentorship program.
- Helped plan Healthy Soils Week 2021 and judged student scholarship applications.

Based on the expectations for my rank and title, I believe in the last two-year cycle I have completed four years of work. I successfully pivoted to serve clientele virtually, and then re-started in-person activities when allowable. I have emerged as a leader for agronomy work in the state, and soil health work in the Western United States. I hope that it is evident my accomplishments over the past two years merit an accelerated promotion.

Statement of Assignment (% FTE): Agronomy Advisor Sutter (45%), Yuba (5%), Colusa (50%) Counties.

Introduction: I am a Cooperative Extension Agronomy Advisor Step IV seeking an accelerated promotion to Associate Advisor Step II with Indefinite Status. I believe that I am currently performing at the Associate level, and I hope that this dossier, which covers all work since I began in July 2017, demonstrates my capacity for a continued and successful career in extension. I have worked to develop and implement a multi-county program that allows me to meet the needs of my clientele through relevant applied research, and the extension of science-based knowledge.

Agronomy is the science of soil management and crop production. Agronomy is interdisciplinary in focus and can include pest management, economics, water management, soil management, and plant nutrition. I am a statewide leader for agronomy work and have gained recognition beyond the state for my leadership and work on soil health. My objective is to help farmers and those who advise farmers improve the economic profitability of farms while protecting our natural resources. My key clientele are growers, pest control advisors (PCAs), and certified crop advisors (CCAs). My secondary clientele are commodity groups, industry partners, conservation/environmental groups, and public agencies.

My multi-disciplinary program includes field crops grown in annual rotations including wheat, corn, dry beans, and sunflower for seed production; and alfalfa, which is grown as a perennial crop. In addition, hemp, a commodity legalized under the 2018 Farm Bill, emerged as a new crop when I began in my role. Sutter County was one of the first counties to have hemp acreage in the state. I responded to this emerging need by taking on statewide leadership in research and extension around hemp production. Though field crops tend to be less profitable than many other commodities grown in California, they remain critical for our food supply, annual crop rotations, and our environment as they provide habitat for many species. I began my work as an advisor by conducting a needs assessment. One focus that emerged is the importance of adding value to the annual crop rotation itself through improved soil management. Much of my work is timely both for my key and secondary clientele. I have two themes:

Improved Soil Management: Soil health, by definition, is the continued capacity of soil to function as a vital living ecosystem that sustain plants, animals, and humans. We need soil to do certain jobs for agriculture and society at large, also known as ecosystem services. These include, but are not limited to, providing space for root growth and root respiration, allowing water to infiltrate when it rains, moving water rapidly through the soil profile to reduce the risk of flooding, storing water for crop use later, and providing habitat for soil organisms. Improved soil management can affect soil function, or the ability of soil to do these jobs. Maintaining healthy soils can help ensure the long-term productivity and viability of California farms and may increase the resilience of our food supply in the face of climate extremes.

Condition changes: I am working to **protect and conserve soil quality** which will lead to **improved food security**. This work promotes **improved management and use of land** and will lead to the **ecological sustainability of agriculture** and **improved water-use efficiency**. Ultimately, this work will lead to **increased preparedness and resilience to extreme weather and climate change**.

Improved Agronomic Production: Improved agronomic production is important for on-farm profitability and can help ensure food security by maintaining high yields. Improved agronomic production helps protect the environment through reduced loss of inputs (fertilizer and pesticides) moving off the farm. As defined above, agronomy is interdisciplinary and work in this theme is often collaborative. I have conducted work in this theme related to nutrient management including optimizing nitrogen management, integrated pest management, water management, and soil management. **Condition changes:** Broadly, I am working to **increase agriculture efficiency and profitability** and **improve food**

security. Specifically, my work in this theme can help **improve water quality, improve air quality, and increase the ecological sustainability of agriculture.**

Applied Research and Creative Activity/Extending Knowledge and Information:

Theme 1: Improved Soil Management

Goal: To encourage clientele to adopt management practices that increase soil health by conducting research, and extending knowledge, to reduce barriers to adoption by addressing agronomic and economic concerns and generating relevant resources.

Background: On-farm management practices can either build or deplete soil function. The United States Department of Agriculture (USDA) Environmental Quality Incentives Program (EQIP) is a federal conservation program that provides technical and financial assistance to farmers who want to implement conservation practices. The California Department of Food and Agriculture (CDFA) Healthy Soils Program (HSP) began in 2017 and provides funding to farmers to implement soil health management practices. The CDFA HSP also funds on-farm research. These programs encourage the implementation of management practices like cover crop planting, compost application, reduced tillage (soil disturbance), and livestock integration. Cover crops are planted to cover and enrich the soil rather than for harvest. Cover crops are planted in soil that is otherwise bare. Typically, in annual crop production, cover crops would grow in the winter months, between summer crops.

Despite the increase in funding for these soil health management practices, there are significant barriers to implementation. Some of the barriers include a lack of information about how to implement the practices (for example what equipment to use to terminate a cover crop), potential management costs and economic benefits of the practices, and uncertainty about the agronomics of the practices and impacts on crop yield, pests (including weeds), soil nutrients, and water. I focused my work in this theme on addressing the concerns of the agricultural sector to reduce these barriers by conducting practical, applied research for improved soil management that is relevant to clientele, as well as extending knowledge to clientele in my region and beyond. Though I have a broad focus on the work conducted in this theme to meet clientele needs, I have become a leader in cover crop research and extension locally, in the state, and in the Western U.S. region.

Inputs: The inputs include 11 projects (2 multi-state, 3 statewide, and 6 regionally focused) with total funding of \$1,358,766. For both funded and unfunded projects, my time, as well as those of colleagues and staff around the state, and our dedicated grower collaborators have been invested.

Methods: The applied projects in this theme all incorporate soil health management practices into annual crop rotations that include the commodities in my program (including dry beans, sunflower, corn, and/or wheat), and I strive to measure the impact of soil health practices on agronomic considerations relevant to producers (crop yield, weed pressure). I have employed various methods and produced outputs to extend knowledge related to improved soil management. During my time as an Assistant Advisor, I organized, co-organized, or led 13 extension meetings, gave 24 presentations, started a [YouTube Channel](#), engaged in an ongoing collaboration with the Colusa Resource Conservation District, engaged public officials, and was an author on 3 peer-reviewed publications, 5 trade journal articles, 19 newsletter articles/blog posts, 3 project summaries/case studies, 8 additional video resources or podcasts, and a cost study.

Cover Crops: As part of a collaborative statewide project, Vegetable Crops Advisor Amber Vinchesi-Vahl and I organized two field days. At our first field day, we surveyed attendees to assess what information annual crop growers needed to incorporate cover cropping into their management practices. Conversations and post-event surveys indicated that barriers to planting cover crops included lack of information on: selecting the right cover crop; expected costs of managing a cover crop; equipment needs; and impacts on soil water dynamics. Information about equipment to manage cover crops emerged as a top concern. Our second field day was a grower-led equipment showcase at which local growers brought tractor implements and shared knowledge about successes and challenges. I subsequently published a newsletter article with a local grower, who has planted cover crop on his farm for many years, about equipment to manage cover crops. I continue to incorporate knowledge about equipment into other extension deliverables related to cover crop management.

To address uncertainty around the impact of cover crops on soil water dynamics, Liz Harper, Executive Director of the Colusa Resource Conservation District (RCD) and I applied for funding from the Cdfa HSP program to quantify the impact of cover crops on soil water dynamics in an annual system. We worked very closely together on this project, which led to increased collaboration between UC ANR and other natural resource organizations in the region. In addition, Liz and I extended knowledge by: beginning a YouTube Channel, [The Soil Health Connection](#) (180 subscribers, 35 episodes), in May 2020 to extend knowledge during the shelter-in-place ordinance; organizing several events together including a virtual field day in March 2021, two drive-by demonstration tours in Spring 2021, and an in-person field day in Winter 2022. To address grower uncertainty related to management costs, Small Farms Advisor Margaret Lloyd and I produced *Estimated Costs For a Winter Cover Crop in an Annual Crop Rotation*, a Cost Study with the Ag Issues Center. To provide information about selecting the right cover crop, and to extend knowledge while not allowed to meet due to social distancing measures, I planted small cover crops plots at 7 sites in the region in the fall of 2020. I shared the map with clientele so that they could stop by and see the demonstration plots.

Because of my leadership on this topic, I was asked to build the board for the Southwest Region of the Western Cover Crops Council (WCCC), which I currently chair. In this capacity, I led the development and organization of a day-long tour focused on all aspects of cover-crop management in the Sacramento Valley. Board members traveled from Arizona and Nevada to participate in this event. We had 45 attendees who joined us at five stops to see cover crop varieties, learn about equipment, improve understanding of the benefits of cover cropping, and engage in discussions with others about managing cover crops. This tour visited two of my research sites at which I had planted over 45 cover crop demonstration plots alongside my research plots. One stop included an equipment showcase. In my role as a board member for the WCCC, I am the Western lead of a multi-state collaborative project to develop a Cover Crop Selection Tool for the entire Western region, which includes 13 states. I am also the Southwest lead of a multi-state outreach project to develop educational resources.

Crop-Livestock Integration: Though livestock integration is promoted as a soil health management practice, conversations with clientele indicated a lack of information about crop-livestock integration into annual cropping systems. However, due to the complex nature of this topic and the differing concerns of farmers and ranchers, a research project or extension deliverable to address barriers was not immediately apparent. Thus, I co-organized a focus group for farmers and ranchers on crop-livestock integration in annual cropping systems. We surveyed attendees and conducted a SWOT Exercise (Strength, Weakness, Opportunity, Threat) for both groups. This event was organized with Livestock Advisor Morgan Doran, and Specialist Amelie Gaudin. Morgan Doran and I subsequently formed a workgroup on this topic, and we are working toward our first collaborative project with Dr. Gaudin and

others. Future research questions that emerged from the focus group included “What are the long-term effects of cover crop grazing on soil health in annual systems in California?” and “What are the economics of implementing grazing on annual land for ranchers and growers?”. Livestock Advisor Josh Davy and I began a grower/rancher led project in Summer 2022 evaluating grazing a summer cover crop. Our project addresses questions identified in the focus group. We are measuring changes in soil health and are quantifying the economics of the management practice.

Other Soil Health: I organized and co-led a Soil Health and Fertility Workshop at the California Alfalfa and Forage Symposium with CE Advisors Michelle Leinfelder-Miles and Nick Clark at which I led hands-on demonstrations related to soil health principles. I also worked with Cole Smith to organize a workshop series on Compost Use in Agriculture. In addition, I am co-PI on a statewide project working to increase the success of reducing or eliminating tillage (soil disturbance) in organic, annual, systems, which is very challenging because of a lack of other weed control options. I have engaged state and local legislators by inviting them to my field days and events. One Yuba County Board of Supervisors member attended my grower meeting and followed up with questions. I worked to deliver information virtually by participating as the UC ANR representative for the CDFA Healthy Soils Week 2021 and was the cover crop lead for the *Healthy Soils for a Healthy California* website, organized by Vice-Provost Mark Bell.

Outcomes and Impacts: My efforts for this theme have focused directly on conducting research and extending knowledge that enables growers to improve soil management. Post-event evaluations indicate that one outcome of this theme is changes in knowledge. At the Soil Health and Fertility Workshop at the Alfalfa Symposium, 86% of attendees rated the workshop as good or excellent and 74% said that their knowledge of soil health concepts improved as a result of the workshop. Of the attendees at the workshop, 84% were growers, consultants, or working in the agricultural industry. At my Healthy Soils and Field Crop Grower Meeting, 83% of respondents said they would use what they learned within the next 12 months and 96% of respondents rated the event as good or excellent. At the Cover Crop Field Day and Equipment Showcase that Amber Vinchesi-Vahl and I co-organized, 79% of respondents indicated an increase in knowledge of equipment needed to manage cover crops after the event as compared to before. At the Healthy Soils, Cover Crops, and Conservation field day organized by the Colusa RCD and me, 79% of participants reported an increased understanding of the benefits of cover cropping. For the day-long WCCC cover crops tour of the Sacramento Valley on a scale of 1 to 5, respondents reported over a 1-point change in knowledge for various categories related to cover crop management including having necessary information to make cover crop management decisions; knowledge about equipment needed; and having a process for cover crop species selection.

Ultimately, the goal of changing knowledge is to change behavior. Another outcome of this work is increased adoption of cover cropping by clientele. One indication of adoption is that when I was looking for a collaborator for my second Healthy Soils Program project, most growers I called were already applying for cover crop incentives grants for their farms and thus could not collaborate with me. These were all growers who I had spoken to about cover cropping, or who had expressed interest in my program by attending one of my field days about cover crops, and I infer that they decided to plant cover crops because of my extension efforts. Measuring change in behavior can be difficult as information is not centralized. However, I can report that the number of acres planted into cover crops through federal incentives programs has increased since I began my work in the region. Cover crops planted in Sutter, Yuba, and Colusa Counties through the USDA EQIP program increased from 206 acres planted in 2018 to 1,950 acres planted in 2022. Our District Conservationist in Colusa County shared with me that since I began my work with the Colusa RCD, we have “moved mountains” on cover crop adoption in the region. A seed company reported a 10% increase in cover crop seed sales in my region

since I began my extension efforts. There is an increase in cover crop planting in my three-county region since I began my extension efforts, which I infer to mean that my work is leading to a change in management practice on farms.

Summary: The anticipated long-term impacts this work are improved soil function through changed soil management practices. In time, these practices will lead to beneficial outcomes including increased microbial activity, improved soil structure, and improved water dynamics. While the effects of climate change are already being felt by California farmers, these changes can help ensure our farms are more resilient to climate extremes thus ensuring a secure food supply and long-term economic viability of farms. To relate this work to our UC ANR **condition changes, protecting and conserving soil quality** will help ensure farmland in California stays productive in the long-term which will lead to **improved food security. Improved management and use of land** through building soil health increases the **ecological sustainability of agriculture** because it leads to **improved water-use efficiency**. Ultimately, because improving soil management will increase the ability of soil to function, this work will lead to **increased preparedness and resilience to extreme weather and climate change** both for farms and society at large (faster water infiltration and reduced risk of flooding, more water storage) and **increased agriculture efficiency and profitability**. The livestock projects will lead to **improved animal management, productivity, and efficiency**.

Theme 2: Improved Agronomic Production

Overall Goal: To conduct and extend relevant research and knowledge regarding improved agronomic production of field crops that will lead to higher on-farm profitability and production efficiencies, improved pest management, and reduced loss of inputs to the environment.

Background: Agronomy implies the integration of disciplines and practices to solve practical problems in agriculture. Field crops are generally considered agronomic crops. For this theme, my work is broadly related to agronomy and agronomic crop production and includes work related to improved nutrient management, breeding for higher productivity, more effective integrated pest management (IPM), evaluating emerging crops, and participating in statewide efforts to extend knowledge.

Inputs: The inputs in this theme include 16 projects (10 statewide) with total funding of \$2,967,416. Funded projects have been supported by commodity boards, as well as the state and federal government. For both funded and unfunded projects, my time, as well of those of many colleagues and staff around the state, and our dedicated grower collaborators have been invested.

Methods: The work in this theme all relates to improved management, productivity, and economic return of crop production for the commodities in my program. I have employed various methods and produced outputs to extend knowledge related to Improved Agronomic Production. During my time as an Assistant Advisor, I organized, co-organized, or led 20 extension meetings, gave 32 presentations, was an author on 8 peer-reviewed publications, 9 trade journal articles, 32 newsletter articles/blog posts, 5 project summaries/case studies, 7 video resources or podcasts, and 5 Cost Studies.

Nitrogen (N) management is an important topic because if nitrogen is not taken up by crops, it can be lost off farms either as a greenhouse gas or through water movement, which can contaminate our waterways and is an environmental concern. For this reason, the state is regulating nitrogen application and growers require science-based resources to improve nitrogen use efficiency and ensure high yields while complying with new rules. For this topic, I am a project leader, PI, or collaborator on four

statewide projects. For a wheat nitrogen project, I hosted 2 field days, presented on this topic at the UC Small Grains Field Day, produced two case studies from my region, and co-produced multiple extension resources with our project team including an online decision support tool. I also participated in the production of a field demonstration video on the soil nitrate quick-test and I led the production of a Spanish language video on this topic. I have presented at multiple meetings on opportunities for improving nitrogen management in annual cropping systems including giving 2 presentations at the Colusa Glenn Subwatershed Program annual meeting, the local organization helping growers comply with the new regulations. I participated in a statewide effort to produce a Nitrogen Management Training for Certified Crop Advisors (CCAs), in which we created a training program for CCAs as well as the certification exam. For this effort, I produced the 2 modules on annual cropping systems and I helped workshop exam questions. I am also a project leader on a project to develop site-specific nitrogen fertilization recommendations for annual crops. Finally, I collaborate on both a project on managing nitrogen in hemp, as well as a project to improve understanding of nitrogen-fixation by beans.

Integrated Pest Management (IPM) is a broad-based approach to pest management that focuses on long-term prevention of pests through a combination of management techniques. Pest management is important for crop production as pests can significantly reduce yields if not controlled. I led a project to investigate weed control options for both organic and conventional growers during alfalfa stand establishment. This project was funded by the California Alfalfa and Forages Association, our grower-led commodity board. I have been a collaborator for several years for the Sacramento Valley location of a black-eye bean varietal improvement trial. These new black-eye bean varieties show improved resistance to the cowpea aphid insect and are also able to tolerate lygus bug pest pressure. Breeding for pest resistance and tolerance is a way to reduce the need to control pests in the field through pesticide spray and other IPM practices. I participated in a project to monitor southern blight, which is a disease that affects sunflowers. I also organized my first independent grower meeting that covered pest management and published various extension resources related to IPM of field crops including sunflower, dry beans, and wheat. In addition, I gave many talks on pest management and environmental protection including 8 presentations for the Pesticide Applicators Professional Association. I produced some of the first extension materials on pest management in hemp, including a peer-reviewed publication documenting herbicide damage to hemp, and materials on how to protect bees while managing pests of hemp. Finally, I try to incorporate pest management into aspects of my work as is relevant to clientele. For example, I collected weed pressure data in the cover crop projects described above and disseminated this information in presentations and extension publications.

Other Agronomy Work: I have collaborated with other members of the Agronomy Program Team to meet the needs of our clientele. I was a co-PI on a statewide needs assessment which resulted in two publications and an online resource. I worked with Specialist Isaya Kisekka to evaluate a new water-management technology in corn which can help optimize irrigation management. Advisor Rachael Long and I have received two years of funding from the California Alfalfa and Forages Association to evaluate the application of almond shells to established alfalfa fields. This project evaluates the opportunity to improve recycling of organic materials in rural areas by assessing if there is a benefit or penalty to alfalfa from this amendment. My work in hemp includes extensive policy engagement including meeting (in person and by phone) with Board of Supervisor members for both Sutter and Yuba Counties, presenting at the CDFA, and presenting to Agricultural Commissioners throughout the state. I participated in the 2018 California Hemp Summit and co-organized the first UC Hemp Field Day in September 2022.

I participate in crop-based programming for UC ANR through co-organizing and participating in extension events including the Western Alfalfa and Forage Symposium, the UC Alfalfa and Forages Field

Day, and the UC Dry Bean Field Day. I participated in organizing regional events such as our county-based grower meetings, which we held both in-person and virtually. I present at regional grower events organized by others such as Spray Safe and our County Ag Commissioner Grower Meetings. After joining the board of the CA Chapter of the Agronomy Society of America, I helped co-organize the 2022 CA Plant and Soil Conference. I have worked on updating peer-reviewed production manuals for sunflower and garbanzo bean. I am a co-author on Cost Studies for garbanzo beans, sunflowers, and alfalfa.

Outcomes and Impacts:

Nitrogen management: Wheat is grown on 450,000-750,000 acres per year in California which provides a great opportunity for reduced nitrogen application. The collaborative project with the small grains team directly impacted 1,800 acres and our project extension webpages had more than 12,400 views with over 840 hours of engagement. I anticipate one of the long-term impacts will be increased understanding of how to improve nitrogen application to small grains, and thus increased profitability for growers and reduced loss of nitrogen to the environment. The Next Generation Nitrogen Management Training for CCAs has had a total of 83 participants with a pass rate of 86%. CCAs are often responsible for advising many growers and managing a large number of acres and this training will help CCAs better advise growers on optimizing nitrogen application for all cropping systems.

Pest management: The California Alfalfa and Forage Association was pleased with my project report and disseminated it alfalfa growers throughout the state. I anticipate growers can use the results of my trial to reduce weed pressure and establish stronger alfalfa stands (reducing the need for herbicide application and increasing yields). The black-eye bean variety trial is a long-term effort led by researchers at UC Riverside and I anticipate these varieties will lead to higher yields as well as reduced need to control these pests (reduced chemical application and cost savings). Since the varieties have been tested in my region, growers can be certain they will yield well. The presentations I gave to the Pesticide Applicators Professional Association have been well received with an average of 98% of respondents being satisfied or very satisfied with my presentations. Post-event feedback from a talk on Cover Crops and Weed Management had an average score of Very Good (4.22 out of 5). The long-term outcome from these presentations is optimized pesticide application and more effective pest control.

Other Agronomy Work: At my Healthy Soils and Field Crop Grower Meeting in February 2020, which covered topics including hemp, pesticide regulation, nitrogen management, and pest management of field crops, 83% of respondents said they would use what they learned within the next 12 months and 96% of respondents rated the event as good or excellent. I met with Sutter County Board of Supervisor (BOS) members to provide expert opinion in advance of their vote on whether to allow hemp production in the county during the first year of legalization. After I provided expert feedback, the BOS decided to allow hemp production, despite moratoriums in some of the neighboring counties. At our UC Hemp Field Day, 94% of total respondents said they learned useful information and plan to use what they learned in next 12 months. On a scale from 1 to 5, feedback averaged by attendees for the 2022 Plant and Soil Conference is as follows: 4.78 total conference rating; 4.70 thought the topics were timely and important; and 4.71 thought the presentations were useful and informative. Feedback from the 2021 Sutter-Yuba Grower Meeting indicated that 95% of respondents thought the information shared at the meeting was useful and that my presentation was valuable. Finally, the total downloads for the cost studies I co-authored were 6,864 through the end of 2021 with an average download of 1,373 per publication. A quantifiable outcome of this theme is change in knowledge. I can infer that change in knowledge will ultimately lead to a change in behavior.

Summary: The anticipated long-term impacts of this work are increased agronomic efficiencies which will increase yields, farm profits, and protect our environment. To relate this work to our UC ANR **condition changes**, ensuring high yields lead to **improved food security**. Improved nitrogen use efficiency means that more pounds of food are being produced with less nitrogen fertilizer application. Not only does this lead to **increased agriculture efficiency and profitability**, it also reduces the risk of nitrogen moving off-farm where it can contaminate our waterways or become a greenhouse gas, which contributes to climate change. Thus, this work can lead to **improved water quality, improved air quality, and increased ecological sustainability of agriculture**. The anticipated impacts of pest management work are **increased agriculture efficiency and profitability** as well as **improved food security**. Finally, the work on water use in corn and hemp will lead to **improved water-use efficiency**.

Professional Competence and Professional Activity

I have maintained my professional competence through various activities and my professional leadership activity has increased throughout my time at UC ANR. When I began, I focused on attending trainings and orientations, and participated in short courses. I attended field days and workshops to see examples of extension delivery. I participated in program teams and workgroups to build my network and orient myself to existing work in the state. I am currently a member of 7 Workgroups and 5 Program Teams. I helped co-found the Livestock-Crop Integration Workgroup in 2022. I maintain my Qualified Applicator Certificate. I have continued to develop my professional competence by engaging in trainings and meetings relevant to my region, the state of California, and beyond. One notable example is my participation in two tours led by the Water Education Foundation. In 2019 I participated in the Northern California Tour and, in 2022, the Bay Delta Tour. At these events I learned about water issues relevant to agricultural production from experts in other disciplines. I had the opportunity to participate in a workshop in Washington, DC for the USDA Conservation Innovation Grants program on behalf of a research group. This project has also provided opportunities for local engagement through farm tours and collaborator discussion meetings with soil health experts and practitioners. In addition, I completed the UC ANR Collaborative Facilitation Training in Spring 2021.

I maintain my membership for 5 professional societies and attended 13 professional society meetings at which I presented 3 posters, 4 oral presentations, and contributed toward the society by judging poster sessions, moderating panels, and in recent years, co-chairing a session. In 2022 I presented a poster at the World Congress of Soil Science in Glasgow, Scotland. I was the only UC ANR academic to attend this event. This poster was on a statewide soil health collaboration and showcased the work of ANR toward meeting our climate change goals and helping growers adapt to climate extremes.

In recent years, I have begun to engage in regional, statewide, and multi-state leadership roles. As evidence of my professional competence, and due to my work with cover crops and soil health, I was invited to join the Western Cover Crop Council (WCCC) as a founding board member in 2019, and currently serve as a member of this board. In addition, I was the founder of the Southwest Committee of the WCCC. In this capacity, I built the regional board by recruiting board members (including academics, farmers, and industry partners) from California, Arizona, and Nevada. I have served as the chair of this board since 2020. I have been recognized for my leadership in soil health work. In 2018 the Conservation Agriculture Systems Innovation Center, which I am a member of, received the Award of Excellence from the Western Extension Directors Association. In 2021, I, and Liz Harper (Colusa Resource Conservation District), were awarded the Conservation Education Award from the Soil and Water Conservation Society (CA and NV Chapter) for our work extending knowledge during the pandemic. Due to the success of building my program, I was invited to present at the UC ANR Programmatic Orientation in 2022.

The professional society for agronomy in the state is the CA Chapter of the Agronomy Society of America (Cal ASA). In 2021 I was invited to present at the Cal ASA annual Plant and Soil Conference and in 2022 I was nominated for the Cal ASA board, on which I currently serve. As further evidence of my professional competence, I have served as the co-Associate Editor of Agronomy Sciences for ANR since 2018 and have contributed to the ANR peer-reviewed process in this role. Finally, in 2018 conducted an IPM Training through the USAID Farmer to Farmer Program in Mozambique. I was recruited for this because of my experience in applied pest management and extending knowledge to farmers.

University and Public Service

My university and public service have increased commensurately with my time at ANR. When I began, I supported existing efforts and took on project-based leadership roles. I have taken on increasing leadership in my service work and was elected co-chair of the Agronomy Program Team in May 2022 and currently serve on the Endemic and Invasive Pests and Diseases Strategic Initiative Panel. I have served on 8 search committees including 3 academic and 5 staff searches, and I chaired 3 of these committees. In 2022 I chaired my first academic search committee. We have increased our staffing in our regional office, and I have served on searches to meet this need. I have taken on several mentorship roles, both formally and informally (UC ANR Public Values Statement: Developing a qualified workforce for California). Notably, I supervised two Planetary Health Center of Expertise Fellows through the UC ANR/Center Collaboration. I mentored a graduate student as they pursued their Extension Certificate. Finally, in 2022 I participated as a mentor in the official UC ANR Mentorship Program in which 100% of mentees stated that they would recommend the program to others in an exit survey.

I set up three Collaborative Tools (Agronomy Program Team, Livestock-Crop Integration Workgroup, Soil Building Management Forum) to help staff and academics share information. I presented at an orientation for the Climate Smart Specialists. I attended multiple events at the state capitol with Government and Community Relations Director, Anne Megaro, including the 100 Year Anniversary of the CA Farm Bureau. After Janine Hasey retired as County Director and the Master Gardener (MG) Advisor, I took over the program for 2 months to help with the transition. I present to the MG groups in my region and in 2022 gave the Soil and Fertilizer Management 4-hour training to the new cohort. I participate in county fairs, local Farm Shows, and Board of Supervisor and Farm Bureau meetings.

I have also taken on service work external to the university related to my area of expertise. For example, I reviewed a progress report on the California Healthy Soils Program for a statewide non-profit and helped plan the Healthy Soils Week 2021 for the state. I participate in local collaborative meetings for regional resource conservation leaders in Sutter and Colusa Counties; and have reviewed grants for the Foundation for Food and Agriculture Research Grant program in my area of expertise. Since starting as a farm advisor, I have been a judge for the UC Davis Future Farmers of America Agronomy Competition, the California State University annual student research competition, and the student scholarship applications for the California Weed Science Society. I have presented to children and youth at local events in my region. I stay engaged with Northern California Water Association as well as the Colusa Glen Subwatershed Program to stay abreast of local water policy issues.

Affirmative Action

I have worked to ensure equity in my program. I assessed the baseline demographics of my clientele by reviewing the 2012 Census of Agriculture data, as well as lists of registered growers and Pest Control Advisors in my counties. Although my clientele is primarily male (98%) and white (92%), I am working to ensure that my program is relevant and accessible to all clientele and am trying to build relationships with women and younger farmers and PCAs whenever possible. In addition, I try to ensure that the work

I conduct is relevant to growers of different size operations. For example, in the recent cost study on cover crops in an annual rotation was co-produced with Small Farms Advisor Margaret Lloyd. We designed the study to be relevant to large and small-scale operations in the region. When relevant to the subject matter, I always apply for both Certified Crop Advisor (CCA) and Irrigation and Nitrogen Management Training Program (INMP) credits. Larger farms tend to use CCA services while smaller farmers often self-certify with the INMP program. To ensure everyone has access to my work and can attend my events, I disseminate information about my program broadly via my newsletter, local media, blogs, and by sharing with partner organizations in the region.

As I am fluent in Spanish, I initiated developing Spanish outreach programming in my region. I came up with the idea to organize a training in my area for field workers. I planned the first Soil, Water, and Pest Management Training for Field Workers in Spanish in March 2019. I did all the planning and promotion for the second of these events for March 2020, but it was scheduled to be about 10 days after the shelter-in-place ordinance, and we had to cancel it. I also have produced five Spanish-language episodes of the Soil Health Connection with subject matter experts. In addition, I gave a presentation on strategies to reduce pesticides moving off farm at the Spanish Session of our local Sutter County Spray Safe event in January 2022 and led the production of a Spanish video on the soil nitrate quick test.

Equity for all includes protecting our natural resources and producing abundant and healthy food for all. My program includes research and extension efforts that strive to: ensure the long-term productivity of our farms; increase soil carbon and build soil health; and to increase agronomic efficiencies. This work is both important for the agricultural community, as well as for all residents of our state. In addition, I have worked to increase my own understanding and knowledge of equity by participating in the “Uprooting Racism in the Food System: A Free Workshop for California Extension Professionals” in Stockton, CA. Finally, I joined the Workforce Diversification Committee in July 2021.

Closing Summary:

My first three terms as an Agronomy Advisor have come at an interesting time. We say that our work in extension is critical because we can respond quickly to meet the needs of our local community. I was on my way to building a successful research and extension program prior to the drastic changes required by social distancing during the pandemic. I quickly pivoted my program to continue to conduct research and extend knowledge during unprecedented times. I then transitioned back to in-person programming when we were allowed. I work to provide science-based solutions to assist my clientele with making day-to-day management decisions. With so many commodities in my program, I have had to prioritize my efforts in a way that benefits the annual production system in my region. I have field crop specific projects (dry beans, corn, alfalfa, wheat, hemp) and others whose goal is to add value to the system through improved soil management and disease management in standard annual rotations that include field crops (including sunflower). I am a collaborator, PI, and co-PI on many statewide projects and have assumed statewide leadership within the Agronomy group. I have also secured my own funding to lead several research projects specific to my region. Finally, I have begun to assume a leadership role beyond the state for my cover crop work. I have employed various extension methods including well-attended in-person meetings, trade-journal and newsletter publications, online resources, and virtual programming. I have worked to balance my program priorities within the four criteria, demonstrating an upward trajectory in each, and continue to build up my research and extension program while trying to serve the diverse residents of our state. I believe that this dossier documents that I am working above the expectations for my rank, that I am on a successful upward trajectory, and that I have the capacity for a continued fruitful career in extension.

Sarah Light—Program Review Dossier—Supporting Documentation

For Accelerated Promotion with Indefinite Status (Assistant IV to Associate II) – Agronomy Advisor

Review Period for Promotion to Associate Rank with Indefinite: July 5th, 2017 to September 30th, 2022.

Review Period for Acceleration: October 1, 2020 to September 30th, 2022

New activities and projects (October 1st, 2020 to September 30th, 2022) for the Acceleration Request are highlighted in darker grey. Projects and activities that began prior to October 1st, 2020, but continued into the review period, are highlighted in a lighter grey. Work that was completed prior to October 1st, 2020 is not highlighted at all but is included for the Promotion and Indefinite Status request.

A. PROJECT SUMMARY TABLE

Theme 1: Improved Soil Management

Total Project Funding in this theme: \$1,358,766. Total allocated to Light: \$453,315.44

New Project funding in this theme (10/1/20-9/30/22): \$421,705. New allocated to Light: \$211,969

Project Title/Duration	My Role	Collaborators	Total Funding (allocated to Light)	Support Source
Multisite Demonstration of Conservation Management Practices for Soil Health and GHG Emissions Reduction 2018-2021	Co-PI	J. Mitchell and W. Horwath (UC Davis), B. Aegerter (CE Advisor San Joaquin County) and M. Leinfelder-Miles (CE Advisor Delta Region), A. Vinchesi-Vahl (CE Advisor Colusa County), S. Stoddard (CE Advisor Merced County); V. Andreotti (Oryza Partnership)	\$235,796 (\$42,841.85 to Light)	California Department of Food and Agriculture - Healthy Soils Program with matched UCANR funds
Securing the future of highly productive organic no-till vegetable production cropping systems in California 2018-2022	Co-PI	J. Mitchell (CE Specialist), A. Shrestha (CSU Fresno), L. Altier, C. Daley, G. Liles (CSU Chico), A. Vinchesi (CE Advisor Colusa County), G. Miyao (CE Advisor Capital Corridor), farmer collaborators throughout CA	\$382,760 (\$0 to Light)	United States Department of Agriculture-Natural Resource Conservation Service Conservation Innovation Grants
Evaluation of Cover Crops on Soil Moisture Dynamics and Demonstration of	PI	L. Harper (Colusa Resource	\$98,673 (all to Light)	California Department of Food and Agriculture Healthy Soils Program

Sarah Light—Program Review Dossier—Supporting Documentation

Winter Cover Crops in a Conventional Farming Rotation in the Sacramento Valley 2019-2022		Conservation District), E. James (Davis Ranches), A. Chesini (Richter Ag), M. Cooper (Richter Ag), K. Richter (Richter Ag)		
Evaluation of Winter Cover Crop Species for their Ability to Mitigate Soil Compaction in an Annual Rotation 2020-2023	PI	A. Chesini (Richter Ag), M. Cooper (Richter Ag), K. Richter (Richter Ag)	\$99,831.59 (all to Light)	California Department of Food and Agriculture Healthy Soils Program
ANR Statewide Climate Smart (AMMP and HSP) Technical Assistance and Training Program-Northern California 2020-2023	Collaborator	K. Bali (CE Specialist), B. Karle (CE Advisor Glenn County), J. Mitchell (CE Specialist), C. Lazcano (UC Davis), D. Zaccaria (CE Specialist), M. Leinfelder-Miles (CE Advisor Delta Region)	\$120,000 (\$0 to Light)	California Department of Food and Agriculture Climate Smart Agriculture Technical Assistance Program
Cover Crop Variety Demonstration Trials 2020-present	PI	N/A	N/A	N/A
Evaluation of Carbon and Nitrogen Cycling in California Rice Cover Crop Systems 2022-2025	Co-PI	W. Brim-Deforest (CE Rice Advisor), M. Leinfelder-Miles (CE Advisor Delta Region), B. Linqvist (CE Specialist), C. Pittelkow (CE Specialist), L. Espino (CE Rice Advisor)	\$99,566 (\$0 to Light)	California Department of Food and Agriculture Healthy Soils Program
Cover Crop Variety Trial in Rice 2022-2023	Co-PI	W. Brim-Deforest (CE Rice Advisor), M. Leinfelder-Miles (CE Advisor Delta Region), B. Linqvist (CE Specialist), C.	\$10,139 (\$0 to Light)	California Rice Research Board

Sarah Light—Program Review Dossier—Supporting Documentation

		Pittelkow (CE Specialist), L. Espino (CE Rice Advisor)		
Development of a Cover Crop Selection Tool for the Western Region 2022-2024	PI	N. Andrews (Oregon State University), M. Yost (Utah State University), K. Wang (University of Hawaii), D. Collins (Washington State University), S. Mirsky (USDA-ARS), many other cover crop experts in the Western United States	\$187,000 (all to Light)	United States Department of Agriculture – Agricultural Research Service
Support Development of the Western Cover Crops Council and enhance cover crop educational resources and adoption in the Western U.S. 2022-2023	Co-PI	N. Andrews (Oregon State University), M. Yost (Utah State University), K. Wang (University of Hawaii), S. Cappellazzi (GO Seed), D. Collins (Washington State University).	\$125,000 (\$24,969 to Light)	United States Department of Agriculture – Natural Resource Conservation Service
Economic and Soil Health Benefits of Grazing Summer Cover Crops 2022-2023	Co-PI	J. Davy (CE Rangeland Advisor), T. Kingsley (Kingsley Ranches), B. Carter (Benden Farms).	N/A	N/A

Theme 2: Improved Agronomic Production:

Total Project Funding in this theme: \$2,967,416. Total allocated to Light: \$78,429

New Project funding in this theme (10/1/20-9/30/22): \$2,314,041. New allocated to Light: \$59,429

Project Title /Duration	My Role	Collaborators	Total Funding (spending authority by Light)	Support Source
UC Statewide Small Grains Variety Testing Program	Collaborator	M. Lundy (CE Specialist), K. Gallagher (Erdman Farms)	\$16,000 (\$500 to Light)	The California Wheat Commission and the California Crop Improvement Association

Sarah Light—Program Review Dossier—Supporting Documentation

(2017-2019)				
Evaluating Tule Technology in Corn Production 2018	Co-PI	I Kisekka (UC Davis), J. and L. Matteoli (Matteoli Brothers Farm)	N/A	N/A
Estimating Wheat Yield Based on In-season Measurements 2018	PI	M. Lundy (CE Specialist)	N/A	N/A
Monitoring southern blight prevalence in Colusa County (2018-2018)	Collaborator	C. Swett (CE Specialist), A. Vinchesi-Vahl (CE Advisor Colusa County)	\$6,000 (\$0 to Light)	California Tomato Research Institute
Characterizing the benefits of alfalfa in rotation and communicating the value of environmental services to the public 2018-2020	Collaborator	D. Putnam (CE Specialist), N. Tautges and K. Scow (UC Davis), R. Long (UCCE Capital Corridor)	\$49,833 (\$0 to Light)	National Alfalfa and Forage Alliance
Reducing weed Pressure During Stand Establishment Using Pre-Plant Weed Germination Followed by Mechanical or Chemical Control 2018-2020	PI	D. Bruno (River Garden Farms)	\$5,000 (all to Light)	California Alfalfa and Forage Association
Achieving Efficient Nitrogen Fertilizer Management in California Wheat (2020-2022)	Project Leader	M. Lundy (CE Specialist), T. Getts (CE Advisor Lassen County), T. Nelsen (Assistant Specialist), M. Leinfelder-Miles (CE Advisor Delta Region), N. Clark (CE Advisor Kings County), G. Galdi (CE	\$300,838 (\$7,500 to Light)	CDFR Fertilizer Research and Education Program and USDA Conservation Innovation Grants

Sarah Light—Program Review Dossier—Supporting Documentation

		Advisor Siskyou County), K. Mathesius (CE Advisor Capital Corridor), K. Gallagher (Erdman Farms)		
Next Generation Nitrogen Management Training for Certified Crop Advisors 2020-2022	Collaborator	S. Darshan (Project Scientist), A. Crump (UC Davis), D. Parker (UCANR CIWR), P. Brown (UC Davis), D. Geisseler (CE Specialist), M. Culumber (CE Advisor Fresno County), K. Bali (CE Specialist), D. Munk (CE Advisor Fresno County)	\$232,784 (\$6,000 to Light)	CDFA Fertilizer Research and Education Program
Statewide Collaborative Needs Assessment for California Agronomy 2020-2021	Co-PI	J. Kanter (UC Davis), N. Clark (CE Advisor Kings County), M. Lundy (CE Advisor), M. Leinfelder-Miles (CE Advisor Delta Region), B. Linqvist (CE Specialist), R. Long (CE Advisor Capital Corridor), V. Koundinya (CE Specialist), W. Brim-DeForest (CE Advisor Sutter-Yuba Counties), D. Putnam (CE Specialist), B. Hutmacher (CE Specialist), C. Pittelkow (CE Specialist)	N/A	N/A
Blackeye Varietal Improvement 2019-2022 (ongoing)	Collaborator	P. Roberts (UC Riverside), B. Huynh (UC Riverside), N. Clark (CE Advisor Kings County), R. Long (CE Advisor Capital Corridor)	\$42,920 (\$0 to Light)	California Dry Bean Advisory Board
University of California Hemp Trials	Co-PI	D. Putnam (CE Specialist), B. Hutmacher (CE Specialist), N. Clark	N/A	N/A

Sarah Light—Program Review Dossier—Supporting Documentation

2019-present (ongoing)		(CE Advisor Kings County)		
Development of site-specific nitrogen fertilization recommendations for annual crops. (2021-2023)	Project Leader	D. Geisseler (CE Specialist), S. Parikh (UC Davis), N. Clark (CE Agronomy Advisor), M. Leinfelder-Miles (CE Delta Crops Advisor), K. Mathesius (CE Agronomy Advisor), R. Wilson, (CE Agronomy Advisor)	\$224,490 (\$0 to Light)	California Department of Food and Agriculture Fertilizer Research and Education Program
Evaluation of Almond Shell Application as a Soil Amendment to Alfalfa Stands (2021-2023)	Co-PI	R. Long (CE Pest Management Advisor)	\$20,000 (all to Light)	California Alfalfa and Forage Research Foundation
Building Agroecological Partnerships to Facilitate Integrated Pest Management in Hemp (2022-2026)	Co-PI	H. Wilson (CE Specialist), K. Britt (UC ANR Post Doc), A. Schilder (Hansen REC Director)	\$994,551 (\$39,429 to Light)	California Department of Food and Agriculture Biologically Integrated Farming Systems
Nitrogen Response of Industrial Hemp Cultivars Grown for CBD, Essential Oils (2020-2023)	Collaborator	R. Hutmacher (CE Specialist), D. Putnam (CE Specialist), N. Clark (CE Agronomy Advisor), D. Geisseler (CE Specialist), G. Koch (UC Davis Graduate Student)	\$225,000 (\$0 to Light)	California Department of Food and Agriculture Fertilizer Research and Education Program
Resolving genomic and ecological drivers of efficient nitrogen-fixation in the legume microbiome 2022-2025	Collaborator	J. Sachs (UC Riverside), B.L. Huynh (UC Riverside), D. Fronk (UC Riverside), N. Clark (CE Agronomy Advisor), R. Long (CE Agronomy Advisor)	\$850,000 (\$0 to Light)	United States Department of Agriculture – National Institute of Food and Agriculture

B. PROFESSIONAL COMPETENCE AND ACTIVITY

Professional Development and Training

UCANR Trainings and Short Courses

Date	Location	Name and/or Description of Activity
8/17/17	Zoom	End Note Training
8/22/17	Davis, CA	Weed Science School (3-day Short Course)
9/11/17	Davis, CA	Impact Writing Workshop
10/10/17	Zoom	PR Training for Merits and Promotions
11/8/17	Online	Collaborative Institutional Training Initiative (CITI) Program
3/8/18	Davis, CA	UCANR Pesticide Policy Training (OPIC)
5/31/18	Davis, CA	Qualitative Data Analysis an Evaluation Planning Training
6/12/18	Davis, CA	Crucial Conversations (2-day Short Course)
7/10/18	Davis, CA	Diagnosing Herbicide Symptoms (2-day Short Course)
9/27/19	Davis, CA	Grant Essentials Summit
3/20/19	Online	UC ANR Pesticide Policy Training (OPIC)
10/23/19	Online	UC ANR Annual Evaluation and Goals Training
11/7/19	Davis, CA	Practical Methods to Measuring Outcomes
11/8/19	Davis, CA	Writing Strong Impact Statements
4/16/20	Online	UC ANR Pesticide Policy Training (OPIC)
5/31/19	Stockton, CA	Uprooting Racism in the Food System
8/4/20- 8/25/20	Online	UCANR Strategic Plan Input Sessions: Increasing Program Resources, Fostering Positive Work Environment, + Expanding Virtual Reach.
3/8/21	Online	Principles of Supervision
4/14/21	Online	UC ANR Pesticide Policy Training (OPIC)
Spring 2021	Online	UC ANR Advanced Collaborative Facilitation Training. Participated in four-week training course on effective collaborative facilitation.
2022	Online	UC People Networking Cohort. Participated in part of this monthly training series.
5/9/22	Online	UC Managing Implicit Bias Series: Completed 6-part series
6/22/22	Online	UC ANR Pesticide Policy Training (OPIC)

UC ANR Program Teams, Workgroups, and Project Meetings

7/27/17	Davis, CA	Research-to-Policy COMPASS Communication Training
---------	-----------	---

Sarah Light—Program Review Dossier—Supporting Documentation

8/9/17	Yuba City, CA	Attended Weedy Rice Workshops (Sutter and Colusa Counties)
9/28/17	Davis, CA	Small Grains Workgroup Meeting
4/9/18	Ontario, CA	Weeds Workgroup Meeting
4/9/18	Ontario, CA	Agronomy Program Team Meeting
4/11/18	Ontario, CA	Integrated Pest Management of Soilborne Pests Workgroup Meeting
7/12/18	UC Davis	Weed Day 2018
10/24/18-10/25/18	Washington, DC	USDA Conservation Innovation Grants—Awardee Orientation Workshop. Participated on behalf of research group.
1/17/19	Stockton, CA	San Joaquin County and Delta Field Crops Meeting
2/20/19	Colusa, CA	Met with California Air Resources Board (CARB) and Colorado State University to COMET Planner Model for CA systems.
3/5/19	Davis, CA	California Climate and Agriculture Network Summit
5/14/19	Yuba City, CA	Economic Contributions of Agriculture to Sutter County: Report Release
6/5/19	Davis, CA	UCANR Pest Management Program Team Meeting
8/7/19	Davis, CA	UCANR Regional Information Session
8/14/19	Davis, CA	Agronomy Program Team and Alfalfa + Small Grains Workgroup
10/7/19	Blue Oaks Ranch	Blue Oaks Writing Retreat (5-day retreat)
3/12/20	Davis, CA	Water Resources Program Team Meeting
9/9/20	Webinar	Almond IPM from a Sacramento Valley Perspective
9/29/20	Online	Small Grains Workgroup Meeting
1/21/21	Online	Agronomy Program Team Meeting
7/12/21	Sacramento, CA	AgriPulse Summit: Attended annual policy summit on CA Agriculture.
5/13/22	Online	Agronomy Program Team Meeting
Fall 2018-Present	Online/in-person hybrid	Our statewide collaborative project team working on reduced disturbance in organic systems has frequent skillshare training/discussion meetings with soil health experts from CA and other states.

Field Days, Tours, Symposiums, Meetings, and Workshops (Including UC, Affiliated Industry, and Commodity Groups)

7/13/17	UC Davis	Weed Day 2017
8/30/17	Rice Expt Station	UC Rice Field Day
9/7/17	Davis	UC Davis Dry Bean Field Day
10/24/17	UCCE Woodland	Meeting with AgStart
11/28/17	Reno, NV	Western Alfalfa and Forage Symposium (3-day program)
4/4/18	Lockeford, CA	Plant Materials Center Cover Crop Field Day
5/8/18	Yolo County, CA	UC Barley and Wheat County Field Tour

Sarah Light—Program Review Dossier—Supporting Documentation

2/28/18	Meridian CA	Farm tour and discussion with Chico State, UCANR, and CASI member organic vegetable farmers of no-till practices at Park Farming Organics
5/17/18	Davis, CA	UC Small Grains/Alfalfa-Forages Field Day
10/3/18	Davis, CA	UC California Wheat Annual Collaborator Meeting
10/10/18-10/12/18	Northern California	California Water Education Foundation Northern CA Water Tour
11/7/18	Hollister, CA	Farm tour and discussion with Chico State, UCANR, and CASI member organic vegetable farmers at Pinnacle Organic Farm.
11/13/18	Stockton, CA	California Bean Board Meeting
1/23/19	Merced, CA	Integrating Climate Change in CA Extension Programs Workshop
3/26/19	Meridian, CA	Equipment viewing and information share at Park Farming Organics with researchers and farmers involved in reduced tillage project.
4/9/19	Sacramento, CA	Dept of Pesticide Regulation: Best Management Practice Symposium
4/11/19	Woodland, CA	California Wheat Commission Meeting
7/2/19	Sacramento, CA	State Water Resources Control Board Meeting/Workshop
3/6/20	Chico, CA	Northern California Water Association Annual Meeting
7/21/20	Sutter County, CA	Sutter County Agricultural Commissioner Hemp Tour
9/23/20	Online	Oregon State University Virtual Hemp Field Day
1/22/21	Zoom	UCANR Statewide Processing Tomato Production Meeting
2/12/21	Zoom	UCANR Hemp Team meeting with Cultivaris (Industry Partner)
2/24/21	Guinda, CA	Farm tour and discussion with Chico State, UCCE, and Full Belly Farms.
9/2/21	Williams, CA	Tour of Morning Star Tomatoes Processing and Packing Plant.
11/3/21	Guinda, CA	Farm tour and discussion at Full Belly Farms.
5/18/22-5/20/22	Delta Region, CA	California Water Education Foundation Bay Delta Water Tour
9/1/22	Davis, CA	UC Davis Dry Bean Field Day
9/28/22	Woodland, CA	Northern Recycling Composting Facility at Yolo Cty Central Landfill

Disciplinary Society/Professional Association:

Membership in Professional Societies:

- The American Phytopathological Society (APS)
- American Society of Agronomy (ASA)
- Soil Science Society of America (SSSA)
- Pest Applicators Professional Association (PAPA)
- Western Cover Crops Council (WCCC)

Professional Society Meetings Attended:

- UC ANR Statewide meeting. 4/9/18-4/12/18. Ontario, CA.

Sarah Light—Program Review Dossier—Supporting Documentation

- CDFA Fertilizer Research and Education Program Conference. 1/1/17-1/2/17. Modesto, CA.
- California Plant and Soil Conference (Agronomy Society of America-California Chapter). 2/6/18-2/7/18. Fresno, CA.
- Oregon Society of Soil Scientists Annual Conference. 3/1/18-3/2/18. Corvallis, OR.
- The American Phytopathological Society Western Division Annual Meeting. 6/26/18-6/27/18. Portland, OR.
- Soil Science Society of America-International Soils Meeting, 1/6/19-1/9/19. San Diego, CA.
- California Plant and Soil Conference (Agronomy Society of America-California Chapter), 2/5/19-2/6/19. Fresno, CA
- Soil Health Institute-Annual Meeting, 7/16/19-7/18/19. Sacramento, CA
- California Plant and Soil Conference (Agronomy Society of America-California Chapter), 2/4/20-2/5/20. Fresno, CA
- Soil Health Institute-Annual Meeting, 7/31/20. Online
- California Plant and Soil Conference (Agronomy Society of America-California Chapter), 2/1/21-2/3/21, Online.
- Tri-Societies (Soil Science Society of America—Agronomy Society of America—Crop Science Society of America) Annual Meeting, 11/8/21-11/10/21. Salt Lake City, UT.
- California Plant and Soil Conference (Agronomy Society of America-California Chapter), 2/1/22-2/3/22, Online.
- World Congress of Soil Science. 8/1/22-8/5/22. Glasgow, Scotland.

Other Professional Society Meeting and Professional Competence Activities:

- Moderated a panel at the APS Western Division Meeting. 6/27/18. Portland, OR.
- Judge for Poster Session: California Plant and Soil Conference (Agronomy Society of America-California Chapter), 2/4/20. Fresno, CA
- Soil Conservation Session Co-Chair. Co-organized and led session. California Plant and Soil Conference (Agronomy Society of America-California Chapter), 2/1/22-2/3/22, Online.
- Organizer and Facilitator. Western Cover Crops Council Southwest Regional Committee: Strategic Planning Board Retreat. 3/2/22. Davis, CA.
- Rules for Speakers Committee. California Plant and Soil Conference (Plant and Soil Conference (Agronomy Society of America-California Chapter). Ongoing. Provide guidance for speakers about conference presentation and effective communication.

Membership in UCANR Workgroups and Program Teams:

- Workgroups: Alfalfa/Forage, Integrated Pest Management of Soilborne Pests, Weeds, Small Grains, Plant Pathology, New Academic Peer Cohort, Livestock-Crop Integration.
- Program Teams: Agronomy, Climate Change, Research-to-Policy, Pest Management, Water Resources
- Other: Diversity, Equity, and Inclusion Alliance Member

Evidence of Professional Competence

*Presentations to Peers (*Invited to Present):*

- *Cover Crop Management. UCCE Capital Corridor. Woodland, CA. 10/24/17.
- *Using the Agronomy Collaborative Tool. Agronomy Program Team. Ontario, CA. 4/9/18.
- *Cover Crop Management in Agricultural Production. Monday Afternoon Weeders (a group of UC Davis weed scientists). Davis, CA. 9/17/18.
- *Northern California Water Issues. UCCE Sutter-Yuba. Yuba City, CA. 10/30/18.
- *Using the Agronomy Collaborative Tool. Agronomy Program Team. Davis, CA. 8/13/19.

Sarah Light—Program Review Dossier—Supporting Documentation

- UC Hemp Research and Updates. Agronomy Program Team Meeting. Davis, CA. 8/14/19.
- *Cover Crop Research in CA. Western Cover Crop Council Board Meeting. Online. 7/29/20.
- Cover Cropping in Agronomic Systems in CA. Agronomy Program Team. Online. 1/14/21.
- *UCANR Hemp Research Updates From the Field (with Specialist Van Butsic). The CLEAR Project. UC Berkeley. Online. 3/18/21.
- *Facilitator. Coordinated and facilitated presentation by UC Davis Agroecologist Amelie Gaudin to Soil Building Farm Management Collaborators including researchers from universities throughout California, farmers, and affiliated advisors. Virtual Meeting. 4/30/21.
- *Building a Successful Research and Extension Program. UCANR Programmatic Orientation. Online. 5/10/22.
- *Skill Share: Engaging Researchers. Invited to present at meeting about a successful collaborative project I am leading. Agronomy Program Team Meeting. Online. 5/13/22.

Posters and Presentations Presented at Professional Society Meetings

- Panelist at Ag 4.0 Conference. South San Francisco, CA. 11/14/18.
- Can Biochar Conserve Water in Agricultural Soils? Poster Presentation. California Plant and Soil Conference. Agronomy Society of America-California Chapter-Annual Meeting. Fresno, CA. 2/5/19.
- How do Long-Term Reduced Disturbance Tillage and Cover Crops Affect Soil Function in California's Central Valley? Soil Health Institute Annual Meeting. Poster Presentation. Sacramento, CA. 7/16/19.
- Evaluating Soil Physical Properties in Response to Soil Management. California Plant and Soil Conference. Agronomy Society of America-California Chapter-Annual Meeting. Virtual. 2/1/21.
- Remote Education and Demonstrations of Advanced Nitrogen Management Tools for Small Grains Growers in California. Tri-Societies (Soil Science Society of America—Agronomy Society of America—Crop Science Society of America) Annual Meeting. Oral Presentation. Salt Lake City, UT. 11/9/21.
- Building an Interagency Collaboration to Increase Soil Health Outreach. Tri-Societies (Soil Science Society of America—Agronomy Society of America—Crop Science Society of America) Annual Meeting. Oral Presentation. Salt Lake City, UT. 11/9/21.
- Herbicide Drift in Hemp. California Weed Science Society Annual Meeting. Oral Presentation. Sacramento, CA. 1/20/22.
- Evaluation of Two Rates of Legume Winter Cover Crop on Soil Function in the Central Valley of California, USA. World Congress of Soil Science. Poster Presentation. Glasgow, Scotland. 8/4/22.

Manuscript Reviews/Contributions to Publications:

- Reviewed script for nitrogen fertilization video. 2/16/18.
- Reviewed General Fertilizer Guidelines for Annual Crops for the California Fertilization Guidelines (a collaboration between UC Davis and CDFG). 2/21/18
- Reviewer for Submission to Journal of Regenerative Agriculture. 5/19/20
- ANR co-Associate Editor of Agronomy Sciences. 1/25/18-present

Licenses

- DPR Qualified Applicator Certificate (2018-present)

Awards and Recognition by Peers

Sarah Light—Program Review Dossier—Supporting Documentation

- Award of Excellence in recognition of Conservation Agriculture Systems Innovation (CASI) Center from the Western Extension Directors Association. July 2018.
- Conservation Education Award. Soil and Water Conservation Society—California and Nevada Chapter. 2021. Received this award as a shared award with Liz Harper, Executive Director of the Colusa Resource Conservation District, for The Soil Health Connection Youtube Channel.

International

- USAID Farmer to Farmer Volunteer; Cafumpe, Gondola District, Mozambique: Provided a 2 week Integrated Pest Management Training to members of the Associação Agropecuária 16 de junho (March 2018)

Professional Leadership and Board Membership (Internal and External to UCANR):

- *Western Cover Crop Council. Serves all states in the Western region. Founding Board Member and Outreach Committee member. (2019-present)*
- *Southwest Committee: Western Cover Crop Council. Service CA, NV, AZ. Board Founder and Chair. (2020-present)*
- *Wildfire Smoke Effects on Hemp Production. Serves CA, WA, OR. Committee member and California Representative (2020-2021)*
- *California Chapter – Agronomy Society of America. Board Member (2021-present)*
- *UCANR Hemp Agroecology Network. Management Team Member. (2022-present).*

Participation in Academic Tenure Process:

- *Provided letter of support for tenure and promotion package at Chico State University (9/17/19)*
- *External reviewer for Promotion Dossier at Oregon State University 9/30/20)*

C. UNIVERSITY SERVICE

Service to the University of California/UCANR

Date	Activity	Org Level	Your Contribution and Leadership Role
8/4/17	Goal 5 Meeting	Statewide	Participated in meeting
12/7/17	PLS 111 at UC Davis	University	Volunteer panel to provide feedback for student final presentations for Agronomic Crop Production course
1/22/18	Hosted visiting students.	International	Shared knowledge on alfalfa production with visiting students from Seoul National University.
4/24/18	Set up Collaborative Tool for UCANR Agronomy Program Team	Statewide	Connected UCCE Agronomy Academics on a statewide scale to address urgent issues, expediting responses and improving peer scrutiny, to rapidly deliver the best information to growers and PCAs.
6/7/18	Meeting with Associate VP and Vice Provosts	County	Provided feedback and shared information about my extension program with Wendy Powers, Mark Bell, and Mark Lagrimini during visit to county.
6/14/18	Website Feedback	Statewide	Provided feedback about the ANR Employee Portal.
6/18/18-6/19/18	Chinese Extension Alliance Delegation	International	Met with and presented on my extension program to the visiting delegation.
8/24/18	100 Yr Anniversary Sutter-Yuba UCCE	County	Contributed to event success by securing product donations, editing event materials, and inviting guests.

Sarah Light—Program Review Dossier—Supporting Documentation

9/20/18	Meeting with Dr. Miguel Sierra	International	Met with visiting scholar from Instituto Nacional de Investigación Agropecuaria, Uruguay.
11/7/18	CA Agricultural Resources Archive	Statewide	Participated in Sutter-Yuba county contribution to project.
12/11/18	Set up Soil Building Farm Management Forum CT	Statewide	Connected UCCE academics, farmers, and allied researchers on a statewide scale to improve communication around research project.
2/3/19	Presented to new Climate Smart Specialists	Statewide	I presented about cover crops and soil health at the orientation for the new CDFA funded Climate Smart Specialists.
6/26/19	100 Year Anniversary Event for CA Farm Bureau	Statewide	Participated in tabling and networking at event at the state capital on behalf of UCANR. Discussed my program with legislators and met Ag Secretary Ross.
7/19-9/19	Master Gardener Advisor	County	I took over short-term as the Master Gardener Advisor during the transition between County Directors.
9/16/19	Hosted visiting Academic	University	Hosted Carol Mallory-Smith, invited speaker, at the UC Davis F. Dan Hess Weed Science Seminar
9/19/19	Sierra Foothills REC	Regional	Organized tour of SFREC for Sutter-Yuba Master Gardeners
10/7/19	Event Engagement Survey	Statewide	Edited Event Engagement Survey (designed to capture engagements with elected officials)
11/14/19	Senate Fellows Tour	University	Participated in planning and securing tour sites
12/3/19	CDFA Healthy Soils Legislative Briefing	Statewide	Participated in tabling and networking at this event at the state capital on behalf of UCANR.
11/2/20	Discussed DEI in UCCE programming	University	Assisted UC SAREP in structing a webinar on racial equity aspects of cooperative extension.
3/24/21	Presented to Climate Smart Specialists	Statewide	Shared knowledge about cover crop research with a statewide ANR team.
Ongoing	Workforce Diversification Committee	Statewide	I joined this committee in July 2021 and have participated in committee activities since then.
Ongoing	Volunteer Facilitator	Statewide	I am listed as a trained facilitator for UCANR following completion of the program in Spring 2021.
5/4/21	Integrated Web Platform Meetings	Statewide	I provided feedback on the proposed plan and for the Integrated Web Platform (IWP).
6/8/21	Hosted Visiting Academic	International	Dr. Madis Pärtel, a Hubert H. Humphrey Fellow from Cornell University.
6/23/21	Meeting with Leadership	Statewide	Participated in one of the listening sessions with senior leadership (Wendy Powers and Tu Tran).
3/23/22	Ag Day at the California Capital	Statewide	Participated in tabling and networking at this event at the state capital in Sacramento on behalf of UCANR.
Ongoing	Endemic and Invasive Pests and Diseases SI Panel	Statewide	I joined the EIPD Strategic Initiative Panel in February 2022 and participate in committee activities in this capacity.
6/15/22	Agriculture Biologists Tour	Statewide	Shared information at a CA Department of Food and Agriculture event for County Ag Biologists.
6/21/22	Set up Livestock-Crop Integration Collaborative Tool	Statewide	I helped form the Livestock-Crop Integration Workgroup with Livestock Advisor Morgan Doran and set up the CT to enable efficient communication.
5/22/22	Co-Chair Agronomy	Statewide	I serve as the co-chair of the Agronomy Program

	Program Team		Team following nomination and election by peers.
--	--------------	--	--

Search Committees:

- Alfalfa Project Scientist at Kearney Agricultural Research & Extension (KARE).
Member. October – December 2020.
- Agricultural Technician in Sutter-Yuba.
Member. November-December 2020.
- Agricultural Technician in Sutter-Yuba.
Chair. June – September 2021.
- Regional Food Systems Area Advisor—Sacramento, Yolo, Solano, Placer, and Nevada Counties.
Chair. February – June 2022.
- Health Soils Program Community Education Specialist. Sutter-Yuba.
Member. April – June 2022.
- Assistant Specialist in Sutter-Yuba.
Member. August – September 2022.
- Cover Crop Selection Tool Coordinator.
Chair. September 2022 - October 2022.
- Agronomy and Weed Management Advisor—Merced, Stanislaus, San Joaquin Counties.
Member. August 2022-December 2022.

Mentorship Roles:

- Spring 2020: Giuliano Galdi Mentoring Committee: Participated in Mentoring Committee for new Agronomy Advisor.
- Summer 2020: UCANR/Planetary Health Center of Expertise Fellowship. Participated in collaborative program by mentoring UC Davis graduate student Helaine Berris as a fellow in my extension program.
- Summer 2021: UCANR/Planetary Health Center of Expertise Fellowship. Participated in collaborative program by mentoring UC Berkeley undergraduate student Cooper Limon as a fellow in my extension program.
- Fall 2021: Mentored a Climate Smart Specialist who wanted to become a Farm Advisor.
- Fall 2021/Spring 2022: UC Davis Extension Certificate. Supervised and mentored UC Davis graduate student Sequoia Williams as an intern for their Extension Certificate requirement.
- 2022: Participated as a mentor in the UCANR Mentorship Program organized by Jodi Azuali. Mentored UCANR staff member Abbi Marrs.

Service to County

Date	Activity	Org Level	Your Contribution and Leadership Role
9/28/17	Mark Bell visit to Yuba City	County	Met with Vice Provost Mark Bell during his orientation tour to discuss discussed regional issues
4/30/18	Yuba-Sutter Farm Bureau	County	Presented regional cooperative extension updates at monthly meeting
11/15/18	Office Fire Safety	County	Found HEPA filters to ensure air safety
12/17/18	Colusa County Collaborative Meeting	County	Participated in discussion on county-wide collaborations with Colusa Resource Conservation District and local NRCS
2/12/19	Sutter-Yuba Master Gardener meeting	County	Presented on Soil Management and Fertility in the Garden to help with new cohort training.

Sarah Light—Program Review Dossier—Supporting Documentation

2/25/19	Sutter-Yuba Farm Bureau	County	Attended Sutter-Yuba Monthly Farm Bureau meeting to share UCCE updates.
4/3/19	Sutter Co. Board of Supervisors	County	Attended Sutter County Board of Supervisors special meeting on Hemp.
4/8/19	Sutter-Yuba Agriculture Workgroup	County	Participated in the Sutter-Yuba Agriculture Workgroup meeting on behalf of UCCE.
7/22/19	Butte Co. Master Gardener meeting	County	Presented on Soil Management and Cover Cropping in the Garden to Master Gardeners.
2/18/20	Colusa Co Master Gardener meeting	County	Presented on Soil Management and Soil Fertility in the Garden.
5/27/20	Sutter-Yuba Farm Bureau	County	Attended monthly Sutter-Yuba Farm Bureau Meeting.
June 2021	Sutter County Fair	County	Participated in planning meetings and set up for the UCANR table at the Sutter County Fair.
7/26/21	Sutter-Yuba Farm Bureau	County	Attended monthly Sutter-Yuba Farm Bureau Meeting.
8/10/21	Yuba County Board of Supervisors	County	Presented on my Extension program at annual budget meeting.
2/3/22	Colusa Farm Show	County	Tabled for UCANR at Farm Show
4/5/22	Sutter-Yuba-Colusa Master Gardener Training	County/Region	I gave the Soil and Fertilizer Management Module (4 hours) training for the new cohort of Master Gardeners in my region.
6/24/22	Sutter County Fair	County	Tabled for UCANR at fair
6/27/22	Sutter-County Farm Bureau	County	Attended monthly Sutter-Yuba Farm Bureau Meeting.
8/9/22	Yuba County Board of Supervisors	County	Presented on my Extension program at annual budget meeting.

Service to Industry and Allied Sector:

Date	Activity	Org Level	Your Contribution and Leadership Role
7/15/20 and 8/19/20	Foundation for Food and Agriculture Research Grant Review	National	Peer Reviewer for FFAR New Innovator in Food and Agriculture Research Award proposals

D. PUBLIC SERVICE

Date	Activity	Org Level	Your Contribution and Leadership Role
9/20/17	Presentation at Sacramento Science Distilled	Regional	Invited talk at Sacramento Science Distilled Café about UCANR and the role of Cooperative Extension (55 people in audience)
12/11/17	Crop Insurance Validation	Regional	Provided information to Galligan Insurance about garbanzo production

Sarah Light—Program Review Dossier—Supporting Documentation

1/19/18	AAUW STEM Conference	Regional	Presented at 3 sessions (75 students total) to encourage middle school girls to pursue careers in STEM
2/23/18	Woodland Community College Field Trip	Regional	Hosted field trip on soils and agriculture for Introduction to Sustainable Agriculture (PLSCI-25) course (9 students)
4/23/18	Sac Valley Water Quality Coalition	Regional	Participated in the local water quality coalition
5/4/18	CSU Student Research Competition Juror	Statewide	Judged student presentations at the CSU Student Research Competition, in which undergraduate students present about their scientific research
5/31/18	Marysville School Nutrition Fair	Regional	Presented to 4 Elementary School Classes at Nutrition Fair (83 students total)
7/23/18	Sutter-Yuba Agricultural Workgroup meeting	Regional	Participated in collaborative meeting with representatives from local RCD, NRCS, and relevant partner groups
10/4/18	Nutrition Lesson at Lincoln Elementary School	Local	Prepared a presentation and lesson about garbanzo beans with our Community Education Specialist.
1/22/19	Hosted Sanghee Gu and Minhee Han	International	Hosted two visiting students from Seoul National University to build international collaboration.
4/2/19	AAUW Women in STEM	County	Presented at the American Association of University Women's 8th grade Women in STEM Conference
3/7/20	FFA Field Day	Statewide	Volunteer judge at Agronomy competition.
10/26/20	CDFA FREP program meeting.	Statewide	Discussed healthy soils practices, and opportunities to reduce nitrate leaching into waterways
12/1/20	Reviewer: "The California Healthy Soils Program: A Progress Report"	Statewide	Reviewed progress report for the California Climate and Agriculture Network. This report evaluates the Healthy Soils Program. I was one of 21 experts who volunteered to support this effort upon being invited.
4/16/21	CSU Chico	Local	Presented to Regenerative Agriculture group.
6/30/21	Natural Resource Defense Council	National	Gave feedback for survey on extension and Historically Black Colleges and Universities + Tribal Colleges.
7/23/21	CA Weed Science Society Scholarship Committee	Statewide	Participated as a judge of student scholarship applications.
12/6/21-12/10/21	CDFA Healthy Soils Week	Statewide	I participated as ANR representative in the planning and production of the CDFA Healthy Soils Week.

E. EXTENSION ACTIVITIES**Meeting Organized (Classes/Short Courses/Demonstrations/Field Days/Other)****Theme 1: Improved Soil Management**

Date(s)	Meeting Name	Topic (# of repetitions)	Role	Location	Attendees
11/27/18	California Alfalfa and Forage Symposium	Soil Health and Fertility Workshop. Hands-on Soil Health and Interpretation. (3)	Co-organizer and lead presenter.	Reno, CA	106
12/6/18	Soil Health and Cover Crop Field Day	CDFA research project. cover crops. soil health demonstrations. (1)	Co-organizer and speaker	Meridian, CA	45
11/6/19	Healthy Soils Field Day and Equipment Showcase	Cover crops, soil health, farm equipment, farmer-to-farmer, regenerative agriculture (1)	Co-organizer and speaker	Meridian, CA	29
2/19/20	Healthy Soils and Field Crop Grower Meeting	Healthy soils, integrated pest management, nitrogen management, crop rotation, hemp (1)	Event organizer and speaker	Yuba City, CA	36
3/17/20	Healthy Soils and Cover Crop Field Day	Healthy soils. Cover crop management. Cover crop variety selection. project results. (1)	Co-organizer and speaker	Meridian, CA	NA (Cancelled COVID)
12/6/21-12/10/21	CDFA Healthy Soils Week	Soil Health Connection Episodes shared for outreach program (1)	Organizer and content provider	Online/Virtual	(ongoing through week)
3/24/21	Winter Cover Cropping in the Sacramento Valley	Soil health, cover crops, soil management, climate change and climate adaptation. (1)	Organizer and speaker	Online/Virtual	43
3/30/21 and 4/6/21	Cover Crop Drive-By Field Tour	Cover Crop Management (2)	Organizer and speaker	Colusa, CA	14
12/2/21; 12/9/21-12/10/21	Compost Use in Agriculture Workshop Series	Compost Selection, Application, and Considerations. (2)	Participated in Brainstorming and Planning with Cole Smith	Virtual and in-person in Salinas, CA	102
2/24/22	Field Day: Healthy Soils, Cover Crops, and Conservation	Cover crop management, conservation practices, research updates (1)	Organizer	Colusa, CA	27
2/28/22	Grazing in Annual Cropping Systems	Focus group with Farmers + Ranchers on grazing on crop land (1)	Organizer	Winters, CA	15
3/3/22	Sacramento Valley Cover	Day-long tour focused on all aspects of cover	Organizer	Sacramento Valley, CA	45

	Crop Tour	crop management. (1)			
9/2/22	Summer Cover Crops Field Day	Field day showcasing variety trial. (1)	Organizer and Presenter	Colusa, CA	28

Theme 2: Improved Agronomic Production:

Date(s)	Meeting Name	Topic (# of repetitions)	Role	Location	Attendees
11/28/17-11/30/17	Western Alfalfa and Forage Symposium	Provides science-based information to alfalfa and forage growers (1)	Time-keeper	Reno, NV	310
3/6/18-3/7/18	Nitrogen Management Training Program for Certified Crop Advisors	Provides CCAs with training on nitrogen management so that they can help improve on farm practices (1)	Moderator	Fresno, CA	67
5/17/18	UC Alfalfa and Forages Field Day	Shares relevant UC research to clientele. (1)	Co-organizer	Davis, CA	50
8/23/18	UC Dry Bean Field Day	Shares relevant UC research to clientele (1)	Assisted with coordination	Davis, CA	30
11/30/18	UCANR CA Hemp Summit	Hemp Farming and Research in CA. (1)	Co-organizer and moderator	Davis, CA	100
3/12/19	Wheat Field Day	Nitrogen use efficiency. Small grain fertilization.(1)	Organizer and speaker	Colusa, CA	25
3/14/19	Soil, Water, and Pest Management Training for Field Workers in Spanish	Soil health, hydrology, soil management, integrated pest management (1)	Event organizer and speaker	Yuba City, CA	15
5/15/19	UC Small Grains-Alfalfa/Forages Field Day	Small grains, alfalfa, IPM, nitrogen management, variety trails and breeding. (1)	Participated in event planning and logistics and spoke at event	Davis, CA	75
3/24/20	Soil, Water, and Pest Management Training for Field workers in Spanish	Soil health, hydrology, soil management, integrated pest management, plant water relations. (1)	Event organizer and speaker	Yuba City, CA	NA (Cancelled COVID)
3/31/20	Workshop: Winter Nitrogen Management in Wheat	N-rich strips, nitrate quick test, remote sensing (1).	Co-organizer and speaker	Esparto, CA	NA (Cancelled COVID)
9/9/2020-10/7/2020	UCCE Sutter-Yuba Continuing Education Webinars Series	9/9: Almond IPM. 9/16: Pest Management Vegetable Crops. 9/30: Integrated Weed Management in Rice. 10/7: Field Crop Pest Management (4)	Co-organizer and speaker	Webinar	164

Sarah Light—Program Review Dossier—Supporting Documentation

12/9/2020	Sutter-Yuba UCCE Virtual Webinar: Sacramento Valley Pest Management Update	Sacramento Valley Pest Management Updates from local advisors covering a range of cropping systems in the region. (1)	Lead organizer and speaker	Webinar	71
December 2020-Present (Ongoing)	Next Generation Nitrogen Management Training for Certified Crop Advisors	This is a certification training program for CCAs. I created, presented, and recorded the training on Nitrogen Management in Annual Crops Training, Module 7 Parts 1 and 2. (4)	Speaker and assisted with outreach	Online Short Course	83
10/20/21	Sutter-Yuba UCCE Grower Meeting	In person meeting to share updates with clientele	Co-organizer and speaker	Yuba City, CA	19
10/25/21	Sutter-Yuba UCCE Grower Virtual Meeting	County office virtual meeting to share updates with clientele	Co-organizer and speaker	Webinar	14
11/18/21	California Alfalfa and Forage Symposium	Soil Health and Fertility, Forage Systems, and Environment (1)	Co-organized Session with Nick Clark	Reno, NV	241
8/31/21	UC Dry Bean Field Day	Dry Bean Research Updates from UC Davis and UCANR (1)	Co-Organized Event with Rachael Long	Davis, CA	38
2/1/22-2/3/22	California Plant and Soil Conference	Research Updates for California Agriculture (1)	Co-Organized with ASA Board	Online/Virtual	98
4/28/22	Demonstrating Efficient N Fertilizer Management Practices in California Wheat	Field day focused on managing nitrogen in wheat to optimize fertilizer application (1)	Organizer and Presenter	Woodland, CA	17
9/22/22	UC Davis Hemp Field Day	First UC hemp field day showcasing research (1)	Organizer	Davis, CA	45

Educational Presentation at a Meeting

Theme 1: Improved Soil Management

Date	Meeting Name	Topic	Location	# Attendees
10/11/17	AgSafe Pesticide Continuing Education Event	Utilizing Cover Crops in Agricultural Production	Stockton	6
11/15/17	CAPCA CCA Seminar	Utilizing Cover Crops in Agricultural Production	Modesto	24

Sarah Light—Program Review Dossier—Supporting Documentation

11/16/17	Sutter County Agricultural Commissioner Event	Utilizing Cover Crops in Agricultural Production	Yuba City	70
12/14/17	Sutter County Agricultural Commissioner Event	Utilizing Cover Crops in Agricultural Production	Yuba City	69
12/15/17	Valley Truck and Tractor Co.	Utilizing Cover Crops in Agricultural Production	Yuba City	35
1/30/18	Sutter Co. Ag Commissioner Small Farmer Event	Utilizing Cover Crops in Agricultural Production	Yuba City	17
11/27/18	California Alfalfa and Forage Symposium	Hands-On Soil Health and Fertility Workshop.	Reno, NV	106
12/6/18	Soil Health and Cover Crop Field Day	Utilizing Winter Cover Crops in Annual Rotations	Meridian, CA	45
12/7/18	Lunch and Learn on the Farm (an Audobon Society Event)	Cover Crop Management	Knights Landing, CA	47
3/14/19	Soil, Water, and Pest Management Training for Field Workers in Spanish	Manejo de Suelos 101	Yuba City, CA	15
3/22/19	Fava Bean Nitrogen Fixation Trial Field Day	Cover Crops in Annual Rotations	Richvale, CA	45
8/16/19	Dry Bean Field Meeting	CDFA Healthy Soils Program	Davis, CA	25
9/4/19	Soil Health and Cover Cropping Field Meeting	Cool Season Cover Cropping	Staten Island, CA	19
11/6/19	Healthy Soils Field Day and Equipment Showcase	Project Overview	Meridian, CA	29
2/19/20	Healthy Soils and Field Crop Grower Meeting	Two presentations: Update on UCCE Healthy Soils Projects and UC Hemp Research Update	Yuba City, CA	36
5/12/20	All Things Avian Event—Wild Farm Alliance Collaboration	Cover Crop Demonstration Site and Role in Reducing Off-Farm Movement of Pesticides and Environmental Contaminants	Colusa, CA	NA (Cancelled COVID)
2/10/21	Cover Cropping Opportunities in Specialty Crops Webinar	Cover Crops in Annual Systems	Webinar	46
3/24/21	Winter Cover Cropping in the Sacramento Valley	Evaluation of two cover crop rates on annual rotations in the Sacramento Valley	Webinar	43
3/30/21	Cover Crop Drive-by Field Tour	Winter Cover Crop Selection	Colusa, CA	14
8/11/21	Regenerative Agriculture Meeting	Experiences with Cover Crops in California	Chico, CA	25

Sarah Light—Program Review Dossier—Supporting Documentation

9/22/21	Sutter County Resource Conservation District: Specialty Crop Hub - Compost	Using Compost on Farms and Understanding the Analysis and Product Label	Yuba City, CA	13
11/15/21	Weed Management in Agronomic Crops for a Changing Environment	Cover Crops and Weed Management: Considerations	Webinar	42
7/14/22	Organic Fertilizer Association of California	Cover Cropping and Weed Management	Webinar	51
9/2/22	Summer Cover Crop Field Day	Summer Cover Crop Selection and Performance	Colusa, CA	28

Theme 2: Improved Agronomic Production:

Date	Meeting Name	Topic	Location	# Attendees
1/17/18	Spray Safe Event Co-presented (my portion was on cover crops and vegetative filter strips)	Water Quality Protection Through Orchard Floor Management and Orchard Spray Drift Management	Yuba City	120
8/23/18	UC Davis Dry Bean Field Day	UC Dry Bean Blog and IPM Update	Davis	30
8/29/18	PAPA Continuing Education Event	Strategies to Reduce Off-Farm Movement of Pesticides and Other Environmental Contaminants	Modesto	250
9/26/18	PAPA Continuing Education Event	Strategies to Reduce Off-Farm Movement of Pesticides and Other Environmental Contaminants	Sacramento	360
12/10/18	Colusa Glenn Subwatershed Program Nitrogen Management CEU Training	Irrigation Strategies for Managing Nitrate Leaching	Williams, CA	100
12/12/18	Sutter County Agricultural Commissioner Grower CE Meeting	Strategies to reduce off-farm movement of pesticides and other environmental contaminants	Yuba City, CA	68
3/12/19	Wheat Field Day	The Nitrogen Opportunity	Colusa County, CA	25
3/24/19	Soil, Water, and Pest Management Training for Field Workers in Spanish	Manejo de Suelos 101	Yuba City, CA	15
5/15/19	University of California Small Grains-Alfalfa/Forages Field	Using Nitrogen Rich Reference Zones to Guide	Davis, CA	75

Sarah Light—Program Review Dossier—Supporting Documentation

	Day	Wheat Topdress Decisions in the Sacramento Valley		
6/20/19	Nitrogen Continuing Education Hours	Irrigation Strategies for Managing Nitrate Leaching	Yuba City, CA	61
7/8/19	Colusa County Grown: Farmer and Rancher Programs 101	UC Cooperative Extension programs and resources	Colusa, CA	15
10/15/19	Delta Corn and Small Grains Field Meeting	In-Season Nitrogen Management in Wheat	Tyler Island, CA	11
12/5/19	PAPA Sacramento Seminar	Strategies to Reduce Off-Farm Movement of Pesticides and Other Environmental Contaminants	Sacramento, CA	380
4/1/20	NMP Continuing Education meeting	Nitrogen and Leaching	Oroville, CA	NA (Cancelled COVID)
5/5/20	University of California Alfalfa/Forages Field Day	Test your Weed ID IQ: Weed identification and finding weed control informant to guide treatments	Davis, CA	NA (Cancelled COVID)
9/17/20	2020 Crop Consultant Conference (statewide industry event)	Developing Best Management Practices for Pests of Hemp in California	Webinar	120
10/7/20	UCCE Sutter-Yuba Virtual Webinar Series	Field Crop Pest Management Update	Webinar	26
12/3/20	PAPA Sacramento Seminar	Strategies to Reduce Off-Farm Movement of Pesticides and Other Environmental Contaminants	Sacramento, CA	NA (Cancelled COVID)
12/9/20	UCCE Sutter-Yuba Sacramento Valley Pest Management Webinar	Field Crop Pest Management Update	Webinar	71
5/12/21	UC Small Grains and Alfalfa Field Day	Weed Control During Alfalfa Stand Establishment	Webinar	91
7/22/21	Improved N Management in California Small Grains Project Meeting	Colusa County Case Study	Webinar	14
9/8/21	Pesticide Applicators Professional Association	Strategies to Reduce Off-Farm Movement of Pesticides and Other Environmental Contaminants	Webinar	227
10/20/21	Sutter-Yuba UCCE Grower Meeting	Optimizing Pesticide Applications and Relevant Field Crop Updates	Yuba City, CA	19
10/25/21	Sutter-Yuba UCCE Grower	Optimizing Pesticide	Webinar	14

Sarah Light—Program Review Dossier—Supporting Documentation

	Meeting Series	Applications and Relevant Field Crop Updates		
12/7/21	Sutter County Agricultural Commissioner Grower CE Meeting	Optimizing Pesticide Applications and Relevant Field Crop Updates	Yuba City, CA	65
12/13/21	Colusa Glenn Subwatershed Program Grower CE Meeting	Nitrogen Management in Annual Cropping Systems	Colusa, CA	80
1/18/22	Sutter County Spray Safe Spanish Session	Estrategias para reducir el movimiento de pesticida y otros contaminantes ambientales	Yuba City, CA	100
3/9/22	Pesticide Applicators Professional Association	Strategies to Reduce Off-Farm Movement of Pesticides and Other Environmental Contaminants.	Sacramento, CA	199
4/28/22	Demonstrating Efficient N Fertilizer Management Practices in California Wheat	Soil nitrate quick test and data interpretation	Woodland, CA	17
5/17/22	UC Davis Small Grains and Alfalfa Field Day	Weed Management During Stand Establishment	Davis, CA	80
6/22/22	Pesticide Applicators Professional Association	Agronomic Weed Management Research Updates from the Sacramento Valley	Webinar	120
6/29/22	Pesticide Applicators Professional Association	Agronomic Weed Management Research Updates from the Sacramento Valley	Webinar	171

Ongoing Collaboration with Other Agency or Organization:

The Colusa Resource Conservation District and I have been collaborating on soil health work in the region. We have a CDFG Healthy Soils Program funded project together through which we do research and extension work together. In addition, we began a YouTube Channel, The Soil Health Connection (more details in “Other” below). The local USDA NRCS office has also been involved by assisting with field sampling and participating as a guest on our YouTube Channel.

Policy Engagement

Date	Description	Topic	Location
4/4/19	Call with Ruthann Anderson, CEO of California Association of Pest Control Advisors (CAPCA)	Discussed Hemp as an emerging commodity including industry pest concerns.	Phone

Sarah Light—Program Review Dossier—Supporting Documentation

4/10/19	Meeting with Sutter County Board of Supervisor members Dan Flores and Mat Conant	Asked to meet to share expert opinion in advance of a BOS vote for or against a moratorium on hemp production.	Yuba City, CA
4/15/19	Meeting with Sutter County Board of Supervisor member Ron Sallinger	Asked to meet to share expert opinion in advance of a BOS vote for or against a moratorium on hemp production.	Yuba City, CA
4/17/19	Call with Sutter County Board of Supervisor members Ron Sallinger and Jim Whiteaker	Asked to meet to share expert opinion in advance of a BOS vote for or against a moratorium on hemp production.	Phone
9/25/19	Hemp sampling with CDFG and Sutter County Agriculture Commissioner	Was invited to participate in regulatory sampling of a hemp field by the Ag Commissioner	Millers Landing, CA
2/12/20	Nursery, Seed, Cotton, and Hemp Program-Annual Staff Meeting	CE Specialist Dan Putnam and I provided subject matter expertise on Preliminary UC Hemp Research	Sacramento, CA
3/4/20	Call with Yuba County Board of Supervisor member Randy Fletcher	Yuba county BOS member attended my grower meeting on 2/19 and wanted to discuss hemp production	Phone
4/20/20	California Air Resources Board Climate Investment Programs Multi-Agency meeting	I was an invited panelist to discuss identifying and inspiring potential applicants.	Webinar
5/7/20	Meeting with Hexas Biomass and Colusa officials	Was invited to participate in a planning meeting for a biomass production project with the mayor of Colusa, the city manager, and industry partners	Zoom
6/25/20	Herbicide Damage on Hemp training for Agricultural Commissioners	Presented on herbicide damage symptoms on hemp to 26 participants from Ag Commissioner offices throughout the state	Zoom
4/14/21	Shared expertise on hemp production with Sutter County Board of Supervisors	Asked by Sutter County Ag Commissioner to provide clarification on hemp production to BOS following contentious community meeting.	correspondence
8/10/21	Yuba County Board of Supervisors Budget Meeting	Presented on my research and extension program	Marysville, CA
9/24/21	The Climate Change Resiliency Collaboration Forum hosted by UCANR and UC Merced.	Presented to state funding agencies about aspects of my program related to state climate mitigation efforts.	Virtual
10/14/21	California Department of Food and Agriculture Healthy Soils Program Advisory Board Meeting	I was asked to submit a letter about the Healthy Soils Program to the Advisory Board. I attended to meeting to discuss the program and my letter was brought up several times.	Virtual

12/15/21	Meeting with CalCAN	Meeting with California Climate & Agriculture Network to Discuss Healthy Soils Program	Virtual
----------	---------------------	--	---------

Other Extension Activity (including websites, social marketing, newsletters, blogs)

Date(s)	Title, Description, and My Role	# of Instances
2017	Pacific Northwest Biochar Atlas: www.pnwbiochar.org . reviewer and contributor. Decision support tool.	1
2017-present	Sacramento Valley Field Crops Blog: contributor	24
2017-present	UC Small Grains Blog: contributor	6
2017-present	Sacramento Valley Field Crops Newsletter: editor and contributor. Solicit, write, and publish submissions. Mail and electronic delivery.	16
2018-present	UC Dry Beans Blog: contributor	5
2018-present	@SacValleyAgronomist on Instagram (281 followers): manager and contributor	152
2018-present	UC Weed Science Blog: contributor	5
2028-present	UC Alfalfa and Forage News: contributor	2
2018-2021	Healthy Soils for a Healthy CA-Cover Crops Lead: reviewer and contributor	1
2020-present	The Nitrogen Fertilizer Management Tool for California Wheat: https://smallgrain-n-management.plantsciences.ucdavis.edu/?page=landing_page reviewer and contributor. Decision support tool.	1
2022-present	Critical Needs for Agronomic Crop Production in California: https://www.uccesurveyresults.com/#/ reviewer and contributor. Shares needs assessment results.	1

The Soil Health Connection: YouTube Channel I hosted during the pandemic with Liz Harper, Executive Director of the Colusa County Resource Conservation District. Episodes in English and Spanish (180 subscribers). Most viewed episode has 511 views. Average views per episode 141.

Date	Guest and Affiliation
5/11/20	Introduction
5/12/20	Dr. Alyssa Devincentis (UC Davis), Emily James (Davis Ranches), Victor Briones (Colusa RCD)
5/27/20	Dr. Cindy Daley (Center for Regenerative Agriculture + Resilient Systems, CSU Chico)
6/9/20	Dr. Kabir Zahangir (USDA NRCS West Region Soil Health Specialist)
6/9/20	Dr. Jeff Mitchell (UC Davis Conservation Agriculture Systems Innovation Center)
6/23/20	Dr. Daniel Geisseler (UC Davis Nutrient Management Specialist)
6/24/20	Dr. Margaret Smither-Kopperl (Director USDA NRCS Plant Materials Center)
7/6/20	Dr. Shannon Cappellazzi (Lead Scientist at Soil Health Institute)
7/15/20	Dr. Amelie Gaudin (UC Davis, Agroecology) ~ Spanish Episode
7/22/20	Kim Gallagher (Erdman Farms)
8/5/20	Jeff Borum (California Soil Health Network)
8/11/20	Jim Pingrey (Colusa County Farm Supply)
8/13/20	Tom Johnson (Kamprath Seed)
8/26/20	Jessica Chiartas (UC Davis)

Sarah Light—Program Review Dossier—Supporting Documentation

9/9/20	Becca Lucas (California Climate Action Network)
9/23/20	Dr. Sam Sandoval (UC Davis, Hydrology) ~ Spanish Episode
10/9/20	Ted Kinsley (Rancher at Kinsley Farms)
10/26/20	Brandi Murphy (USDA NRCS Soil Conservationist)
11/9/20	Billy Synk (Project Apis m.)
11/23/20	Soil Sampling Demo with Sarah Light
12/3/20	Dr. Cristina Lazcano (UC Davis, Soil Science) ~ Spanish Episode
12/21/20	Rachael Long (UC Cooperative Extension Farm Advisor)
1/28/21	Mallika Nocco (UC Davis, Extension Specialist)
2/22/21	Carlos Suarez (USDA NRCS California State Conservationist) ~ Spanish Episode
3/5/21	Jennifer Wallace Sanders (Colusa County Farmer, Wallace Bros)
3/26/21	Dr. Tim Bowles (UC Berkeley Agroecologist)
4/10/21	Field Report: Cover Crop Variety Chat with Sarah Light
4/24/21	Dr. Claire Phillips (USDA ARS Soil Scientist)
5/7/21	Jeremy Allen (Farmer, Five Kingdoms Farm + Western Cover Crops Council President)
5/19/21	Sierra Reading (Small Herd Grazer in Colusa County)
7/8/21	Konrad Mathesius (UC Cooperative Extension Farm Advisor)
8/18/21	Jacqueline Vega (USDA NRCS Soil Scientist) ~ Spanish Episode
8/21/21	In-Field Soil Health Assessments with Victor Briones and Sarah Light
10/29/21	In-Field Soil Nitrate Quick Test Demonstration with Sarah Light and Dr. Cindy Daly
12/2/21	Dr. Lauren Hale (USDA ARS Soil Microbiologist)

Media related to my research and extension program: (including press releases, media references, social media references, radio, newspaper, and magazine interviews and/or articles about my work):

Date	Author/ Interviewer	Topic	Media/Publication
9/25/17	Kitty Bolte	Nitrogen Use Efficiency, relevant field crops research, and the Role of Cooperative Extension	KDVS (90.3 FM). Local Dirt Radio Program
3/6/18	Pamela Kan-Rice	UC estimates costs and returns for growing garbanzo beans	ANR News Releases
4/18/18	Jeffrey P. Mitchell	CASI ANR team begins two new CDFA soil health projects!	Conservation Agriculture Blog
3/15/18	Pamela Kan-Rice	UC estimates costs and returns for growing garbanzo beans	Morning AgClips
6/7/18	Chris Kaufman	Interviewed about my program with UCCE. Article title: Taking a Closer Look at Soil.	Appeal-Democrat
6/20/18	Fred Hoffman	Abiotic Disorders of Sunflower	KSTE (650 AM). Farm Hour Radio Program.
9/30/18	Chris Kaufman	UC Cooperative Extension creates network of researchers, educators	Appeal-Democrat
10/4/18	Pamela Kan-Rice	New UCANR cost study for growing hybrid sunflower seeds helps farmers estimate costs	UCANR News Release

Sarah Light—Program Review Dossier—Supporting Documentation

10/24/18	Bob Johnson	Southern blight shows up unexpected places in 2018 (Southern blight collaboration)	AgAlert
11/26/18	Jeannette E. Warnert	Organic Farmers and Researchers Strive to Advance Soil (CIG research project)	UCANR News Release
11/28/18	Democrat Staff	Farmers and landowners can learn more about creating habitat (Field day at which I presented)	Daily Democrat
11/28/18	Progressive Forage Staff	My soil health demo at the California Alfalfa and Forage Symposium is featured	Progressive Forage Facebook
11/28/18	Ruby Larson	UC Cooperative Extension sponsors field day (cover crop field day featured)	Appeal Democrat
12/9/18	Jeffrey P. Mitchell	Soil Health Field Day in Meridian—press release	UCANR CASI Blog
12/6/18	Ruby Larson	Researchers study enriching soil (cover crop soil health project)	Appeal Democrat
1/29/19	Patrick Cavanaugh	Cover crops between annual veg crops studied (about cover cropping project)	California Ag Today
3/10/19	Lynzie Lowe	Get an Ag Lesson During Wheat Field Day in Colusa Tuesday	Colusa County Sun Herald
3/13/19	Brian German	Researching soil health using cover crops (about cover cropping project)	AgNet West
3/18/19	Tim Hearden	Growers find success with nitrogen savings (N management in wheat project)	Western Farm Press
3/27/19	Tim Hearden	UC helps growers comply with new regulations (N management in wheat project)	Western Farm Press
4/17/19	Bob Johnson	Researchers say not to apply all N in one application (N management in wheat project)	Ag Alert
7/8/19	UC ANR Communications	California Farm Bureau – 100 Years	UC ANR Youtube Channel
8/10/19	Jeffrey P. Mitchell	Gaudin and Light will serve on the Western Cover Crop Council on behalf of California!	CASI blog
11/6/19	Amber Vinchesi-Vahl	Southern Blight in processing tomatoes: diagnosis, management, and monitoring	Progressive Crop Consultant
12/20/19	UCANR Communications Team	2019 Highlights: UCANR (the picture about resources for Spanish-speaking Californians is for a training for farm workers that I planned and organized in my counties.)	UC ANR Youtube Channel
1/29/20	Jeff Larson	Colusa Farm Show Insert (interview about local hemp production)	Appeal Democrat
2/1/20	Tim Hearden	California ag faces a decade of challenges (my wheat field day included)	Western Farm Press

Sarah Light—Program Review Dossier—Supporting Documentation

2/19/20	Bob Johnson	Improved Precision helps minimize water requirements (N management in wheat project) requirements (N management in wheat project)	Ag Alert
6/16/20	Joyce Mansfield	CDFA tweet about my Soil Health Connection Youtube channel	Twitter
7/22/20	Bob Johnson	Test zones show farmers grain crops' fertilizer needs (N management in wheat)	AgAlert
8/31/20	Jeannette E. Warnert	UC Cooperative Extension to Investigate Healthy Soil Practices with CDFA Grants (my project is featured)	AgNetWest
9/3/20	Jeannette E. Warnert	UCCE Cooperative Extension and Colusa RCD launch 'Soil Health Connection'	UCANR Green Blog
9/9/20	Staff Article	UCCE and Colusa RCD launch Soil Health Connection channel (media about Youtube channel)	Colusa County Sun Herald
9/9/20	CDFA OEFI	UCCE and Colusa RCD Launch Soil Connection on Youtube (media about channel)	Various (this is a press release)
9/9/20	Staff Article	UCCE and Colusa RCD launch Soil Health Connection channel	News Break
9/9/20	Staff Article	Article about Soil Health Connection Youtube channel	Colusa County Sun-Herald
9/16/20	Fran Howard	Oversupplied CBD hemp market hit by pandemic	AgriPulse
10/3/20	Staff Article	Experts say local crops seem to be doing well	Appeal Democrat
10/14/20	Bob Johnson	Summer heat, smokey skies affect state's dry-bean crops	Ag Alert
November December 2020	Sheryl Feit	UCCE Cover Crop Resources cited	USDA-NRCS California Soil Health Newsletter
12/9/20	Staff Article	3-Hour Seminar to Focus on Pest Mgmt on Rice, Field Crops, and Processing Tomatoes	California Ag Today
12/16/20	UCCE Sutter-Yuba	UCCE Sutter-Yuba: 2020 Year in Review	Facebook
January 2021	Lynzie Lowe	Looking for Better Ways: Cooperative Extension staff helps ag industry with research, training	Appeal Democrat - Business Life Quarterly Edition.
January 2021	Whitney Brim-Deforest	Introduction to the University of California Cooperative Extension Sutter-Yuba	Crop Talk

Sarah Light—Program Review Dossier—Supporting Documentation

2/5/21	UCANR Communications Team	2020 Year in Review: My Youtube Channel, the Soil Health Connection, is featured.	UCANR Youtube Channel
2/17/21		Project Evaluated Winter Cover Crops to Build Soil	Ag Alert
3/31/21	Danita Cahill	USDA Passes Final Rules on Hemp Growing	Organic Farmer Magazine
4/7/21	Ruby Larson	UCCE hosts drive-by field visit for cover crop demonstration plots	Appeal Democrat (front page about my field day)
5/26/21		Study calculates costs of growing organic hay	Ag Alert
5/28/21	Jeannette Warnert	New UC hemp publication shows potential symptoms caused by herbicide drift	UCANR Green Blog
5/28/21		New UC hemp publication shows potential symptoms caused by herbicide drift	Morning Ag Clips
April/May 2021	Danita Cahill	USDA passes final rules on hemp growing: Agency makes changes based on grower input and experiences	Organic Farmer Magazine
6/9/21	Bob Johnson	Alfalfa benefits from reducing weeds before planting	Ag Alert
6/11/21	Jeff Larson	The Idea Behind Crop Rotation	Appeal Democrat
6/25/21	Brian German	New Publication Outlines Herbicide Drift Symptoms on Hemp	AgNet West-article and LinkedIn about my work
June/July 2021	Jeannette E. Warnert	University of California hemp research to address water, N issues in 2021	Organic Farmer Magazine
August/September 2021	Mitch Lies	Improving Understanding of Herbicide Drift Symptoms on Hemp	Organic Farmer Magazine (interview about my work)
September 2021	Whitney Brim-Deforest	UCCE Sutter-Yuba-Colusa Continuing Education Seminars	Various (this is a press release)
September 2021	Lynzie Lowe	Ag Life: Three for Three	Appeal Democrat
September/October 2021	Jeannette E. Warnert	Ongoing University of California hemp research to address water, N issues	Progressive Crop Consultant
9/9/21	David Wilson	Wildfire smoke impacts crops, workers	Appeal Democrat
10/6/21	Bob Johnson	No-till farming lets roots and worms nurture the soil	Ag Alert
10/28/21	Mike Hsu	New 'big data' tools help California wheat farmers reduce fertilizer guesswork	UC ANR Blog
October/November 2021	Danita Cahill	Hemp research takes a closer look at plant responses to nitrogen	Organic Farmer Magazine

Sarah Light—Program Review Dossier—Supporting Documentation

1/7/22	Staff Article	Cover crop tour scheduled for farmers and ranchers.	Colusa County Sun-Herald
1/26/22		Farmers invited to tour cover crops in the Sacramento Valley March 3	Morning Ag Clips – California Edition
1/28/22	UC ANR Communications	Light wins Conservation Education Award	UC ANR Employee News
1/31/22	UC ANR Communications	Farmers invited to tour cover crops in Sacramento Valley March 3	Connected – Newsletter of UC ANR
2/16/22	Bob Johnson	Organic ‘soil huggers’ promote reduced-till farming	Ag Alert
3/1/22	UC ANR Communications	Sacramento Valley Cover Crop Tour Highlighted	UC ANR Employee News
3/7/22	CDFA	CDFA Awards \$1.49 Million for Biological Pest Management	Various (this is a release about hemp project)
3/22, 4/22	Jacqueline Vega-Pérez	Colusa Soil Health and Cover Crops Field Day	USDA-NRCS California Soil Health Newsletter
4/19/22	Taylor Chalstrom	Cover Crop Research and Resource Offer Important Considerations for the Practice	West Coast Nut (article about my field day)
5/2/22	Gary and Captain Funk	Interviewed about my research and extension program for local radio.	93Q Marysville
May/June 2022	Margaret Smither-Kopperl and Zahangir Kabir	Using Cover Crops Effectively: Sacramento Valley Cover Crop Tour	USDA NRCS California Soil Health Newsletter
6/9/22	Tim Hearden	Will electric trucks work on the farm?	Farm Progress
July 2022	Tim Hearden	Ford touts EVs for ag, but are they practical?	Western Farm Press
8/31/2022	UC ANR Communications	Announcement about my attendance at the World Congress of Soil Science	UC ANR Employee News UC ANR Twitter UC ANR LinkedIn
9/12/22	Pam Kan-Rice	UC to present hemp research at field day on Sept. 22	Various (this is a press release)
9/16/22	Pam Kan-Rice	Field day to highlight hemp research	Western Farm Progress
9/16/22	Pam Kan-Rice	Field day to highlight hemp research	Farm Table
9/16/22	Staff article	To till or not to till: that is the question	Eco Farm

F. PUBLICATIONS (BIBLIOGRAPHY)

Publications are separated by those from this review cycle October 1st, 2020 to September 30th, 2022 (for Acceleration Request) and those previously reported, from July 5th, 2017 to September 30th, 2020, (for Promotion and Indefinite Status).

Total publications, and those new from the last two-year review cycle, are summarized in the table below. Publications are in chronological order from oldest to newest.

Peer Reviewed	
B - Peer-reviewed scholarly journal publications (5 new)	8
C - Other peer-reviewed publications (1 new)	3
Non-Peer Reviewed	
A - Popular press articles (45 new)	88
D - Technical reports and other non-reviewed articles (11 new)	16
E - Published abstracts (13 new)	18
TOTAL	133

PEER REVIEWED

B - Peer-reviewed scholarly journal publications

July 5, 2017 to September 30th, 2020 (previously reported publications) [3 publications]

- Phillips, CL; Light, SE; Gollany, HT; Chiu, S; Wanzek, T; Meyer, K; Trippe, KM (2019). Can biochar conserve water in Oregon agricultural soils? *Soil & Tillage Research*. 198. November 28. <https://doi.org/10.1016/j.still.2019.104525>
Role: Led field work for this project and contributed toward manuscript production with co-authors.
- Phillips, C; Light, S; Lindsey, A; Wanzek, TA; Meyer, KM; Trippe, K (2020). Preliminary evaluation of a decision support tool for biochar amendment. *Biochar*. Springer. Published online. February 19. <https://doi.org/10.1007/s42773-020-00037-3>
Role: Led greenhouse trial for this project and contributed toward manuscript production with co-authors.
- Xue, J; Bali, KM; Light, SE; Hessels, T; Kisekka, I (2020). Evaluation of remote sensing-based evapotranspiration models against surface renewal in almonds, tomatoes and maize. *Agricultural Water Management*. 238. April 20. <https://doi.org/10.1016/j.agwat.2020.106228>
Role: co-PI for maize field work and data collection.

October 1, 2020 to September 30th, 2022 [5 publications]

- Huynh, BL; Duong, T; Clark, N; Long, R; Light, S; Dahlquist-Willard, RM; Ehlers, JD; Close, T; Roberts, PA (2021). Registration of aphid-resistant California Blackeye 77 cowpea. *Journal of Plant Registrations*. Crop Science Society of America. 1-8. April 5. <https://doi.org/10.1002/plr2.20176>
Role: Collaborator for Sutter County field locations; contributed toward manuscript production with co-authors.
- Kanter, J; Clark, NE; Lundy, M; Koundinya, V; Leinfelder-Miles, M; Long, R; Light, SE; Brim-Deforest, WB; Linnquist, B; Putnam, D (2021). Top management challenges and concerns for agronomic crop production in California: Identifying critical issues for extension through needs assessment. *Agronomy Journal*. 1-17. September 25. <https://doi.org/10.1002/agj2.20897>
Role: Participated in survey development and dissemination process; contributed toward manuscript production with co-authors.
- Mitchell, JP; Shrestha, A; Epstein, L; Dahlberg, A; Ghexxehei, T; Araya, S; Richter, B; Kaur, Henry, P; Munk, DS; Light, S; Bottens, M; Zaccaria, D (2021). No-tillage sorghum and garbanzo yields match or exceed standard tillage yields. *California Agriculture*. September 30. <https://doi.org/10.3733/ca.2021a0017>
Role: Contributed toward manuscript production.
- Santiago, S; Light, SE; Clark, NE; Wang, Z; Mathesius, K & Geisseler (2022). Seasonal Net Nitrogen Mineralization in the Topsoil of Subsurface Drip Irrigated Fields. *Communications in Soil Science and Plant Analysis*. August 31. <https://doi.org/10.1080/00103624.2022.2118305>
Role: Project Leader for Colusa County field locations, contributed toward manuscript production beginning with the first draft through to publication.
- Light, SE; Sullivan, DM; Horneck, DA (2022). Timing of potassium chloride application effect on soil and potato uptake of chloride. *Agrosystems, Geosciences & Environment*. Crop Science Society of America and American Society of Agronomy. September 5. <https://doi.org/10.1002/agg2.20301>
Role: Managed project field work, data collection, and analysis as graduate research project. Authored majority of paper; corresponding author.

C - Other peer-reviewed publications

July 5, 2017 to September 30th, 2020 (previously reported publications) [2 publications]

- RF, Long; Leinfelder-Miles, M; Mathesius, K; Bali, K; Light, S; Galla, M; Mueller, S; Fulton, A; Clark, N; Meyer, RD (2019). Garbanzo Bean (Chickpea) Production in California. *ANR Publication*. D. Putnam. Davis, Ca, UCANR. 8634. January. <https://anrcatalog.ucanr.edu/pdf/8634.pdf>
Role: Provided editorial support for publication.
- Long, RF; Gulya, T; Light, SE; Bali, K; Mathesius, K; Meyer, RD (2019). Sunflower Hybrid Seed Production in California. UCANR Publication. 8638. March. <https://anrcatalog.ucanr.edu/pdf/8638.pdf>
Role: Provided editorial support for publication and wrote part of the crop standards section.

October 1, 2020 to September 30th, 2022 [1 publication]

- Light, SE; Hanson, B (2021). Herbicide Symptoms on Hemp. *UC ANR Publications*. 8689. May. <https://anrcatalog.ucanr.edu/pdf/8689.pdf>
Role: developed project idea, co-led field observations; co-authored manuscript; corresponding author.

NON-PEER REVIEWED

A - Popular press articles

Trade Journal Articles:

July 5, 2017 to September 30th, 2020 (previously reported publications) [7 publications]

- Light, S; Niederholzer, F (2018). Optimizing on farm inputs: strategies to reduce the off-farm movement of environmental contaminants. *Progressive Crop Consultant*. K. Coatney. JCS Marketing. 3:5, 8-12. Sept/Oct. <https://www.yumpu.com/en/document/fullscreen/62119532/pcc-septoct-2018-final-e>
Role: wrote first draft of article.
- Light, SE; Aegerter, B (2019). Tips for In-Field Diagnosis and Sampling. *CAPCA Adviser*. 22:3, 44-48. June 2019. https://issuu.com/capcaadviser/docs/2019-06_adviser_web
Role: co-wrote article.
- Light, SE (2019). Management Practices to Improve Soil Function. *Progressive Crop Consultant*. 4:4, 22-24. July/August 2019. https://issuu.com/myaglife/docs/07_pcc_julyaugust_2019
- Light, SE (2020). Incorporating Compost in your Fertilizer Program. *California Fresh Fruit Magazine*. 37:1, 10. January. <https://calfreshfruit.com/2020/01/01/read-january-2020-issue/>
- Light, SE (2020). Managing Soil Fertility with Organic Amendments. *Organic Farmer*. 3:2. April/May. https://issuu.com/myaglife/docs/04_of_aprilmay_2020
- Light, SE; Long, RF (2020). Pest Management Benefits of Implementing Soil Health Practices. *CAPCA Adviser*. California Association of Pest Control Advisers. 23:3. June. https://issuu.com/capcaadviser/docs/2020-06_capca_adv_web
Role: co-wrote article.
- Berris, H; Light, SE (2020). Protecting Bees in Hemp Production. *Organic Farmer*. 3:4. August/September. https://issuu.com/myaglife/docs/08_of_augustseptember_2020
Role: co-wrote article.

October 1, 2020 to September 30th, 2022 [7 publications]

- Light, SE (2020). Pests In Hemp. *Organic Farmer Magazine*. JCS Marketing. 3:6, 24-26. December 15. https://issuu.com/myaglife/docs/12_of_decemberjanuary_2020
- Leinfelder-Miles, M; Clark, N; Nelsen, T; Getts, T; Mathesius, K; Light, S; Galdi, G; Lundy, M (2021). Using N-Rich Reference Zones to Inform In-Season Nitrogen Fertilization in California Small Grains. *Progressive Crop Consultant*. JCS Marketing. 6:2, 8-11. March/April. https://issuu.com/myaglife/docs/03_pcc_marchapril_2021

Role: contributed toward multi-year project that informed this article; provided editorial support.

- Light, S (2021). Pre-Plant Weed Management Followed by In-Season Control for Improved Alfalfa Stand and Yield. *Progressive Crop Consultant*. JCS Marketing. 6:3, 16-20. May 18. https://issuu.com/myaglife/docs/05_pcc_mayjune_2021
- Light, SE (2021). New UC publication documents herbicide damage symptoms on hemp. *CAPCA Adviser Magazine*. August. <https://capca.com/publication/adviser-magazine-august-2021/>
- Light, S (2021). Implementing Nitrogen Rich Reference Zones to Inform In-season N Fertilization in Small Grains. *Crop Talk*. Yuba Sutter Farm Bureau. 16:11. September. https://issuu.com/yuba-sutterfarmbureau/docs/99459_ysfb_crop_talk_volume_15_no_11_digital
- Light, S; Vinchesi-Vahl, A (2022). Winter Cover Crops in Annual Rotations. *Progressive Crop Consultant*. JCS Marketing. 7:5, 24-27. July/August. https://issuu.com/myaglife/docs/pcc_july_august_2022_final_draft/2
Role: co-led field work, data collection, and data analysis that informed this article; co-wrote article.
- Light, S (2022). Cover crops and winter weed management: considerations for annual rotations in wet and dry years. *CAPCA Adviser*. 25:4, 46-50. August. https://capca.com/wp-content/uploads/2022/07/2022-08-ADVISER-Aug2022_LOW.pdf

Newsletter Articles and Blog Posts (UC and External):

July 5, 2017 to September 30th, 2020 (previously reported publications) [31 publications]

- Light, SE (2017). Meet our new Agronomy Advisor in Sutter, Yuba, and Colusa Counties. S. Light. August. http://cesutter.ucanr.edu/newsletters/Agronomy_Notes70414.pdf
- Light, SE (2018). Accurate Diagnosis is Necessary for Disease Management. *Sacramento Valley Field Crops Newsletter*. Yuba City, CA. 2. Winter. http://cesutter.ucanr.edu/newsletters/Agronomy_Notes73810.pdf
- Light, SE; Mathesius, K (2018). Concepts in Soil Nitrate Management in Wheat and Other Winter Grasses. *Sacramento Valley Field Crops Newsletter*. 2. Winter. http://cesutter.ucanr.edu/newsletters/Agronomy_Notes73810.pdf
Role: co-wrote article.
- Light, SE (2018). Strategies to Reduce Disease on Your Farm. *Sacramento Valley Field Crops Newsletter*. Yuba City, CA. 2. Winter. http://cesutter.ucanr.edu/newsletters/Agronomy_Notes73810.pdf
- Long, RF; Light, SE (2018). Ascochyta blight found in garbanzo beans in the Sacramento Valley. *UC Dry Bean Blog*. February 9. <https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=26328>
Role: co-wrote article.
- Long, RF; Galla, M; Mathesius, K; Light, S; Putnam, D (2018). Key to managing springtime weeds in seedling alfalfa stands: Patience. *Alfalfa and Forage News*. April 6. <https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=26814>
Role: provided editorial support.
- Long, RF; Light, SE (2018). Abiotic disorders to watch for in hybrid sunflower seed production. *Sacramento Valley Field Crops Newsletter*. Yuba City, CA. 3. Summer. http://cesutter.ucanr.edu/newsletters/Agronomy_Notes75475.pdf

Role: co-wrote article.

- Light, SE (2018). Avoiding and Managing Soil Compaction. *Sacramento Valley Field Crops Newsletter*. Yuba City, CA. 3. Summer.
http://cesutter.ucanr.edu/newsletters/Agronomy_Notes75475.pdf
- Long, RF; Light, SE (2018). Disease issues in garbanzo production in the Sacramento Valley. *Sacramento Valley Field Crops Newsletter*. Yuba City, CA. 3. Summer.
http://cesutter.ucanr.edu/newsletters/Agronomy_Notes75475.pdf
Role: wrote Charcoal Rot section.
- Light, SE (2018). Charcoal Rot on Garbanzos in the Sacramento Valley. *UC Dry Bean Blog*. June 25. <https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=27415>
- Light, SE (2018). Why I left my Boots in Mozambique. *UC Weed Science Blog*. September 24.
<https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=28246>
- Light, SE (2018). Cover Crop Management in Annual Farming Systems. *Sacramento Valley Field Crops Newsletter*. Yuba City, CA. 4. Fall.
http://cesutter.ucanr.edu/newsletters/Agronomy_Notes76822.pdf
- Lundy, M; George, NA; Rodriquez, M; McCullough, E; Nelsen, T; Becker, T; Matheius, K; Leinfelder-Miles, M; Krill-Brown, A; Galla, M; Light, S; Marsh, B; Wright, SD; Clark, N; Solorio, R; Maciel, F (2018). 2017-2018 UC Statewide Small Grain Variety Testing Results Update. *UC Small Grains Blog*. October 18.
<https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=28476>
Role: Collaborator for Colusa County data collection.
- Light, SE; Geisseler, D (2019). Soil Sampling: A Review and Resources. *Sacramento Valley Field Crops Newsletter*. Winter.
http://cesutter.ucanr.edu/newsletters/Agronomy_Notes78769.pdf
Role: wrote first draft of article.
- Mathesius, KP; Swett, C; Light, SE (2019). Stripe Rust: be on the lookout. *Sacramento Valley Field Crops Blog*. March 11, 2019.
<https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=29651>
Role: co-wrote article.
- Long, RF; Light, SE (2019). Vegetated filter strips for water quality protection on farms. *Sacramento Valley Field Crops Newsletter*. Winter 2019.
http://cesutter.ucanr.edu/newsletters/Agronomy_Notes78769.pdf
Role: co-wrote article.
- Light, SE; Vinchesi, A (2019). Winter Weed Observations in Cover Crop Research Plots. *UC Weed Science Blog*. March 27, 2019.
<https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=29772>
Role: co-led field work, data collection, and data analysis that informed this article; co-wrote article.
- Mathesius, KP; Light, SE (2019). Septoria Leaf Blotch: Reducing Inoculum After a Pathogen-friendly Winter. *Sacramento Valley Field Crops Blog*. July 16.
<https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=30817>
Role: co-wrote article.
- Lundy, M; Nelsen, T; McCullough, E; Light, S; Mathesius, K; Leinfelder-Miles, M; Sosnoskie, L; Clark, N; Marsh, B; Wilson, R; Culp, D; Solorio, R (2019). 2018-19 UC Statewide Small Grain Variety Testing Results. *UC Small Grains Blog*. September 29.
<https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=31431>
Role: Collaborator for Colusa County data collection
- Light, SE (2019). Organic Amendment Management. *Sacramento Valley Field Crops Newsletter*.

4. December. https://cesutter.ucanr.edu/newsletters/Agronomy_Notes82608.pdf
- Light, SE (2019). Using Compost. *Sacramento Valley Field Crops Newsletter*. December. http://cesutter.ucanr.edu/newsletters/Agronomy_Notes86733.pdf
 - Light, SE; Hanson, B (2020). Herbicide Damage Symptoms on Hemp. *UC Weed Science Blog*. March 9. <https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=39604>
Role: co-led field observations; co-wrote blog post.
 - Leinfelder-Miles, M; Clark, N; Light, S; Mathesius, K; Getts, T; Galdi, G; Nelsen, T; Lundy, M (2020). Implementing N-Rich Reference Zones to Inform In-Season N Fertilization Practices. *UC Small Grains Blog*. May 27. <https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=42576>
Role: contributed toward multi-year project that informed this article; provided editorial support.
 - Clark, N; Getts, T; Galdi, G; Nelsen, T; Leinfelder-Miles, M; Light, S; Mathesius, K; Lundy, M (2020). Hand-held electronic devices help you make better nitrogen fertilizer decisions. *UC Small Grains Blog*. June 30. <https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=42903>
Role: contributed toward multi-year project that informed this article; provided editorial support.
 - Long, RF; Light, SE (2020). Managing Sunflower Head Moth. *Sacramento Valley Field Crops Newsletter*. July. http://cesutter.ucanr.edu/newsletters/Agronomy_Notes85829.pdf
Role: co-wrote article.
 - Light, SE (2020). Project Summaries. *Sacramento Valley Field Crops Newsletter*. July. https://cesutter.ucanr.edu/newsletters/Agronomy_Notes85829.pdf
 - Long, RF; Light, SE (2020). New California blackeye varieties show resistance to cowpea aphid. *UC Dry Bean Blog*. August 15. <http://beans.ucanr.org/?blogpost=43376&blogasset=91063>
Role: Collaborator for Sutter County field locations; contributed toward blog posting.
 - Light, SE; Long, RF (2020). Why Aren't My Crops Drying Down. *UC Dry Bean Blog*. September 18. <http://beans.ucanr.edu/?blogpost=43708&blogasset=91063>
Role: co-wrote article.
 - Light, SE; Vinchesi-Vahl, A (2020). Winter Cover Crop Performance in the Sacramento Valley. *Sacramento Valley Field Crops Newsletter*. 7. September. http://cesutter.ucanr.edu/newsletters/Agronomy_Notes86733.pdf
Role: co-led data collection and analysis that informed article; co-authored article.
 - Park, B; Light, SE (2020). Equipment to Manage Cover Crops in Annual Rotations. *Sacramento Valley Field Crops Newsletter*. 7. September. http://cesutter.ucanr.edu/newsletters/Agronomy_Notes86733.pdf
Role: co-wrote article.
 - Light, SE; Vinchesi-Vahl, A (2020). Healthy Soils Demonstration Project Results: Winter Cover Crops in Annual Rotations. *Sacramento Valley Field Crops Newsletter*. September. https://cesutter.ucanr.edu/newsletters/Agronomy_Notes86733.pdf
Role: co-led field work, data collection, and data analysis that informed this article; co-wrote article.

October 1, 2020 to September 30th, 2022 [20 publications]

- Long, R; Light, S; Baldwin, R; Putnam, DH (2021). Unwelcome Grazers: Geese Sweep in and Strip

- Alfalfa and Grain Fields Bare. *Alfalfa and Forage News*. February 20.
<https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=45921>
Role: co-wrote blog posting.
- Light, SE (2021). Cover Crop Varieties in the Sacramento Valley. *Sacramento Valley Field Crops Newsletter*. 8. February.
https://cesutter.ucanr.edu/newsletters/Agronomy_Notes88518.pdf
 - Light, SE (2021). Cover Cropping in Dry Years in California: Observations from 20 Years in the Field with Tom Johnson from Kamprath Seed. *Sacramento Valley Field Crops Newsletter*. 8. February. https://cesutter.ucanr.edu/newsletters/Agronomy_Notes88518.pdf
 - Long, R; Light, S; Baldwin, R; Putnam, DH (2021). Geese Damage to Small Grain Fields. *UC Small Grains Blog*. February 22.
<https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=45927>
Role: co-wrote article.
 - Light, SE (2021). Research Summary: Pre-plant Weed Management Followed by Mechanical or Chemical Control Improves Alfalfa Stand and Yield. *UC Weed Science Blog*. March 5.
<https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=46040>
 - Harper, E; Briones, V; Light, S (2021). The Soil Health Connection: a virtual depot of soil-related discussions. *NRCS California Soil Health Newsletter*. March/April.
Role: co-wrote article.
 - Briones, V; Light, S (2021). The Soil Health Connection: Conexión de la Salud del Suelo en Español. *NRCS California Soil Health Newsletter*. March/April.
Role: co-wrote article.
 - Harper, L; Briones, V; Light, S (2021). Partner Showcase: Colusa County RCD and UC Cooperative Extension. *NRCS California Soil Health Newsletter*. 4. March/April.
Role: co-wrote article.
 - Light, SE; Putnam, DH (2021). Pre-plant weed management followed by in-season weed control improves alfalfa stand and yield for both Organic and Conventional Growers. *Alfalfa & Forage News*. March 12.
<https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=46088>
Role: led all aspects of project that informed this article; conducted all data analysis; authored article.
 - Long, RF; Leinfelder-Miles, M; Light, S; Putnam, D; Murdock, J; Sumner, D; Kan-Rice, P (2021). Organic alfalfa hay cost study released. *UC ANR Alfalfa & Forage News*, April 27.
<https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=46452>
Role: contributed toward blog posting with co-authors.
 - Carvalho de Souza Dias, JL; Clark, N; Mathesius, K; Light, S; Hanson, B; ME, Lundy; Shrestha, A (2021). Poor control of common chickweed with ALS-inhibitor herbicides reported in multiple small grain fields in the southern San Joaquin Valley. Is it a new case of herbicide resistance in California? *UC Weed Science Blog*. August 4.
<https://ucanr.edu/blogs/UCDWeedScience/index.cfm?tagname=chickweed>
Role: contributed toward blog posting with co-authors.
 - Light, SE (2021). Pests in Hemp. *Sacramento Valley Field Crops Newsletter*. 9. August.
https://cesutter.ucanr.edu/newsletters/Agronomy_Notes90493.pdf
 - Light, SE (2021). Pre-plant weed management followed by in-season control improved alfalfa stand and yield. *Sacramento Valley Field Crops Newsletter*. 9. August.
https://cesutter.ucanr.edu/newsletters/Agronomy_Notes90493.pdf
 - Lundy, ME; Nelsen, T; Clark, N; Leinfelder-Miles, M; Mathesius, K; Light, S; Galdi, GC; Getts, T (2021). New Tools to Improve N Management in California Small Grain Crops. *UC Small*

Grains Blog. October 21.

<https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=50718>

Role: contributed toward multi-year project that informed this article; provided editorial support.

- Light, SE (2022). Winter Cover Crop Performance in a Drought Year. *Sacramento Valley Field Crops Newsletter*. January.
https://cesutter.ucanr.edu/newsletters/Agronomy_Notes91779.pdf
- Long, R; Leinfelder-Miles, M; Light, S; Schmidt, R; Putnam, D (2022). Healthy soils for healthy alfalfa stands—what are the strategies? *UC ANR Alfalfa & Forage News*. July 14.
<https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=53518>
Role: contributed toward blog posting with co-authors.
- Light, SE; Williams, S (2022). Cover Crops and Winter Weed Management: Considerations for Annual Rotations in Wet and Dry Years. *Sacramento Valley Field Crops Newsletter*. July.
https://cesutter.ucanr.edu/newsletters/Agronomy_Notes94090.pdf
Role: collected data that informed this article; authored article.
- Light, S; Al-Khatib, K; Long, RF (2022). Herbicide Damage to Baby Lima Beans Planted Prior to a Cold Spell. *UC Dry Bean Blog*. August 12.
<https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=54951>
Role: collected field observations and co-authored blog posting.
- Light, S (2022). UCCE Cover Crop Resources for Fall Planting. *Sacramento Valley Field Crops Blog*. August 23. <https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=55021>
- Light, SE (2022). Summer Cover Crop Performance in the Sacramento Valley. *Sacramento Valley Field Crops Newsletter*. 12. September.
https://cesutter.ucanr.edu/newsletters/Agronomy_Notes94973.pdf

Project Summaries and Case Studies:

July 5, 2017 to September 30th, 2020 (previously reported publications) [2 publications]

- Berris, H; Light, SE (2020). BeeSafe: BotaniGard Maxx Best Management Practices in Hemp. June. <https://ucanr.edu/sites/sutteryuba/files/328743.pdf>
Role: co-wrote article.
- Light, SE; Vinchesi-Vahl, A (2020). Project Summary: Healthy Soils Demonstration Project Results: Winter Cover Cropping in Annual Rotations. September.
<https://ucanr.edu/sites/sutteryuba/files/337746.pdf>
Role: co-led field work, data collection, and data analysis that informed this article; co-wrote article.

October 1, 2020 to September 30th, 2022 [6 publications]

- Light, SE; Gallagher, K; Nelsen, T; Lundy, M (2020). N-Rich Reference Zone Case Study: Colusa County 2019-2020. November. <https://ucanr.edu/sites/small-grains/files/339248.pdf>
Role: wrote case study.
- Light, SE (2021). Pre-plant Weed Management Improves Alfalfa Stand and Yield. *California Weed Science Society Research Update and News*. 15:1, 23-28. March.
https://www.cwss.org/wp-content/uploads/2021/03/CWSS_Research_Update-March-2021-1.pdf
- Light, S; Hanson, B (2021). Herbicide Damage Symptoms on Hemp. *CWSS Research Update and*

News. California Weed Science Society. 15:2, 2-5. October. https://www.cwss.org/wp-content/uploads/2021/10/CWSS_Research_Update-October-2021.pdf

Role: co-led field observations; co-wrote project summary.

- Light, SE; Gallagher, K; Nelson, T; Lundy, M (2021). N-Rich Reference Zone Case Study: Colusa County 2020-21. November. <https://ucanr.edu/sites/small-grains/files/359219.pdf>
Role: wrote case study.
- Light, SE (2022). Project Summary: Winter Cover Crop Performance in the Sacramento Valley in a Drought Year (2020-2021). January. <https://ucanr.edu/sites/sutteryuba/files/362688.pdf>
- Light, SE (2022). Project Summary: Summer Cover Crop Performance in the Sacramento Valley – 2022. September. <https://ucanr.edu/sites/sutteryuba/files/373352.pdf>

Video Resources:

July 5, 2017 to September 30th, 2020 (previously reported publications) [2 publications]

- Giang, D; Mathesius, K; Light, SE; Nelsen, T; Leinfelder-Miles, ML; Lundy, M (2020). Video: In-field Soil Nitrate Quick Test: California Grain Production. April. https://www.youtube.com/watch?v=LaMxiDsov04&feature=emb_logo
Role: participated in video production in field; provided editorial support.
- SE, Light (2020). Bulk Density Demonstration Video. UCCE Sutter-Yuba. September 10. https://www.youtube.com/watch?v=UltHwHnVs-8&feature=emb_logo

October 1, 2020 to September 30th, 2022 [7 publications]

- Light, SE; Harper, E. (2020-2021). The Soil Health Connection. Youtube Channel. 35 Episodes (5 in Spanish). <https://www.youtube.com/@TheSoilHealthConnection>.
Role: co-host and co-producer.
- Light, SE; Harper, E. (2020). Soil Sampling Demo. November 23. <https://www.youtube.com/watch?v=vNZyPJqQzq&t=137s>
Role: co-host and co-producer.
- Harper E.; Light, SE. (2021). Field Report: Cover Crop Variety Chat with Sarah Light. April 10. <https://www.youtube.com/watch?v=HP0Ily503Lo>
Role: co-host and co-producer.
- Light, SE; Harper, E; Briones, V. (2021). In-Field Soil Health Assessments. August 21. https://www.youtube.com/watch?v=N4l-RX1-6_I
Role: co-host and co-producer.
- Light, SE; Harper, E; Briones, V. (2021). Guía para la Evaluación de la Calidad y Salud del Suelo. August 18. <https://www.youtube.com/watch?v=E5DgztnuBXc>
Role: co-host and co-producer.
- Light, SE; Harper, E. (2021). In-Field Soil Nitrate Quick Test Demonstration. October 29. https://www.youtube.com/watch?v=ebjch_nyhKU
Role: co-host and co-producer
- Light, SE; Cisneros-Aguilar, A.; Giang, D.; Mathesius, K.; Nelson, T.; Leinfelder-Miles, M.; Lundy, M. (2022). Video: Test Rapido de Nitratos en Suelo (doblado en Espanol). S. Light. June. <https://www.youtube.com/watch?v=pCvIFvxWGNQ>
Role: participated in video production in field; oversaw all aspects of video editing; produced video; contributed toward script translation.

Podcasts:

July 5, 2017 to September 30th, 2020 (previously reported publications) [1 publication]

- Light, SE; Hoffman, F (2019). Abiotic Disorders of Sunflowers. Farm Hour Radio Program. KSTE (650 AM). April 6. <https://www.iheart.com/podcast/64-kste-farm-hour-28303867/episode/kste-farm-hour-huge-snow-year-30790780/>
Role: interviewed for podcast.

October 1, 2020 to September 30th, 2022 [5 publications]

- Light, SE; Hoffman, F (2020). Farm Hour Radio Program: Cover Crops in the Sacramento Valley- Part 1. KSTE (650 AM). November 19. <https://www.iheart.com/podcast/64-kste-farm-hour-28303867/episode/despite-smoke-damage-vintners-claim-2020-74187422/>
Role: interviewed for podcast.
- Light, SE; Hoffman, F (2020). Farm Hour Radio Program: Cover Crops in the Sacramento Valley- Part 2 . KSTE (650 AM). November 25. <https://www.iheart.com/podcast/64-kste-farm-hour-28303867/episode/does-ash-effect-wine-grape-quality-74426115/>
Role: interviewed for podcast.
- Light, SE; Chalstrom, T (2021). My Ag Life: Pests In Hemp. JCS Marketing. Episode 49. January 28. <https://myaglife.com/2020/12/18/pests-in-hemp-crop-and-yield-loss-still-being-assessed-in-this-new-commodity-organic-farmer-december-january/>
Role: interviewed for podcast.
- Light, SE; Gordon, P (2021). Growing the Valley Podcast: Soil Health. P. Gordon. April 20th. <https://www.growingthevalleypodcast.com/podcastfeed/2021/4/20/sarah-light-on-soil-health>
Role: interviewed for podcast.
- Light, SE; Chalstrom, T. (2022). My Ag Life: Cover Crop Events and Sustainable Groundwater Management Act. JCS Marketing. February 11. <https://dailynews.myaglife.com/podcast/episode-268-february-11-2022-cover-crop-events-and-sustainable-groundwater-management-updates/>
Role: interviewed for podcast.

D - Technical reports and other non-reviewed articles

Cost Studies:

July 5, 2017 to September 30th, 2020 (previously reported publications) [3 publications]

- Clark, N; Light, SE; Leinfelder-Miles, M; Long, R; Stewart, D (2018). Sample costs to produce garbanzo beans (chickpea) in Southern San Joaquin Valley. Davis, CA, UCANR Agricultural Issues Center. https://coststudyfiles.ucdavis.edu/uploads/cs_public/5b/00/5b001795-5a45-4340-a83f-76ca9d8ce6af/2018garbanzobbeansjvsouthfinaldraft3118.pdf
Role: participated in developing cost study assumptions and contributed toward manuscript writing.
- Light, SE; Leinfelder-Miles, M; Long, R; Clark, N; Stewart, D (2018). Sample costs to produce

garbanzo beans (chickpea) in the Sacramento Valley and the Northern San Joaquin Valley. Davis, CA, UCANR Agricultural Issues Center.

https://coststudyfiles.ucdavis.edu/uploads/cs_public/8c/23/8c232c39-e3b8-4f12-ac02-911cb4602cc2/2018garbanzobeansacvalfinaldraft22018.pdf

Role: participated in developing cost study assumptions and co-authored cost study

- Long, RF; Light, SE; Galla, M; Murdock, J (2018). Sample costs to produce sunflowers for hybrid seed in the Sacramento Valley. Davis, CA, UCANR Agricultural Issues Center.
https://coststudyfiles.ucdavis.edu/uploads/cs_public/18/2d/182dcc66-2b3e-4048-b639-b87d0a6456fd/2018sunflowerssacval-finaldraft_92618.pdf

Role: participated in developing cost study assumptions and contributed toward manuscript.

October 1, 2020 to September 30th, 2022 [3 publications]

- Long, RF; Leinfelder-Miles, M; Light, SE; Putnam, D; Murdock, J; Sumner, DA (2020). Sample Costs to Establish and Produce Alfalfa Hay. UC Davis Agricultural Issues Center. October.
https://coststudyfiles.ucdavis.edu/uploads/cs_public/02/ee/02ee0710-8c2c-41ea-8b25-736d1854b737/alfalfasvdraft10420.pdf

Role: participated in developing cost study assumptions and contributed toward manuscript writing.

- Long, R; Leinfleder-Miles, M; Light, SE; Putnam, D; Murdock, J; Sumner, DA (2021). Samples Costs to Establish and Produce Organic Alfalfa Hay. UC Davis Agricultural Issues Center. April.
<https://coststudyfiles.ucdavis.edu/uploads/pub/2021/04/20/alfalfaorganiccadraft42021.pdf>

Role: participated in developing cost study assumptions and contributed toward manuscript writing.

- Light, S; Lloyd, M; Berris, H; Stewart, D; Goodrich, B. (2022). Estimate Costs for a Winter Cover Crop in an Annual Rotation. Department of Agricultural and Resource Economics at University of California, Davis. September.
<https://coststudyfiles.ucdavis.edu/uploads/pub/2022/09/28/2022covercropsbenefits.pdf>

Role: derived idea for study from needs assessment; led the development of cost study assumptions with co-authors through clientele interviews; co-authored cost study.

Progress Reports:

July 5, 2017 to September 30th, 2020 (previously reported publications) [2 publications]

- Roberts, PA; Huynh, BL; Clark, NE; Matthews, WC; Light, SE; Long, RF (2019). Blackeye Varietal Improvement – 2019 Progress Report. University of California Dry Bean Research 2019 Progress Report. California Dry Bean Advisory Board.

Role: Collaborator for Sutter County field locations; contributed toward report.

- Light, SE (2020). Evaluation of Cover Crops on Soil Moisture Dynamics - 2020 Annual Report. California Department of Food and Agriculture Healthy Soils Program Demonstration Projects. July.

October 1, 2020 to September 30th, 2022 [8 publications]

- Light, SE (2020). Final Project Report: Reducing Weed Pressure During Stand Establishment Using Pre-Plant Weed Germination Followed by Mechanical or Chemical Control. California Alfalfa and Forage Research Foundation. October.
- Roberts, PA; Huynh, BL; Clark, NE; Matthews, WC; Light, SE; Long, R (2021). Blackeye Varietal Improvement - 2020 Progress Report. California Dry Bean Advisory Board. February. Role: Collaborator for Sutter County field locations; contributed toward report.
- Roberts, PA; Huynh, BL; Clark, NE; Matthews, WC; Light, SE; Long, RF (2021). Blackeye Varietal Improvement - 2021 Progress Report. University of California Dry Bean Research 2021 Progress Report. California Dry Bean Advisory Board. Role: Collaborator for Sutter County field locations; contributed toward report.
- Mitchell, J; Stoddard, S; Lenfelder-Miles, M; Aegerter, B; Light, S; Vinchesi-Vahl, A (2021). Multisite demonstration of conservation management practices for soil health and GHG emissions reduction - Final Project Report. California Department of Food and Agriculture Healthy Soils Program Demonstration Projects. April. Role: co-Project Leader for Sutter County locations; contributed toward report.
- Light, SE (2021). Evaluation of Cover Crops on Soil Moisture Dynamics - 2021 Annual Report. California Department of Food and Agriculture Healthy Soils Program Demonstration Projects. July.
- Light, SE (2021). Evaluation of Winter Cover Crop Species for their Ability to Mitigate Soil Compaction - 2021 Annual Report. California Department of Food and Agriculture Healthy Soils Program Demonstration Projects. July.
- Light, SE (2022). Evaluation of Cover Crops on Soil Moisture Dynamics - 2022 Annual Report. California Department of Food and Agriculture Healthy Soils Program Demonstration Projects. August.
- Light, SE (2022). Evaluation of Winter Cover Crop Species for their Ability to Mitigate Soil Compaction - 2022 Annual Report. California Department of Food and Agriculture Healthy Soils Program Demonstration Projects. August.

E - Published abstracts

July 5, 2017 to September 30th, 2020 (previously reported publications) [5 publications]

- Phillips, C.L.; Light, S.E.; Gollany, H.T.; Wanzek, T.; Trippe, K.M (2018). Can biochar conserve water in Oregon soils? US Biochar Initiative. August. Role: Led field work for this project when I worked at the USDA.
- Light, Sarah; Phillips, Claire L.; Wanzek, Tom; Gollany, Hero T; Trippe, Kristin (2019). Can Biochar Conserve Water in Agricultural Soils? Agronomy Society of America: California Chapter - California Plant and Soil Conference Proceedings. February. <https://ucanr.edu/sites/calasa/files/318824.pdf> Role: Led field work for this project; co-wrote abstract; prepared and presented poster.
- Light, Sarah; Araya, Samuel; Ghezzehei, Teamrat; Roy, Robert; Garcia, Sophia; Ruiz, Liliana; Mitchell, Jeff (2019). How do Long-Term Reduced Disturbance Tillage and Cover Crops Affect Soil Function in California's Central Valley? Soil Health Institute. July. Role: co-wrote abstract; prepared poster with co-authors; I presented poster.
- Phillips, C.L.; Meyer, K.M.; Light, S.E.; Gollany, H.; Wanzek, T.; Trippe, K.M (2019). Perspectives from field, greenhouse, and modeling studies. Soil Science Society

of America, Agronomy Society of America, Crop Science Society of America. November.
<https://scisoc.confex.com/scisoc/2019am/meetingapp.cgi/Paper/122913>

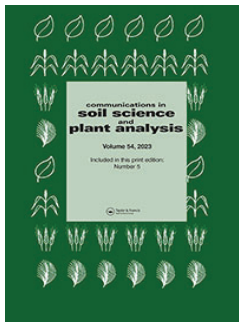
Led field and greenhouse work for this project when I worked at the USDA.

- Huynh, Bao-Lam; Clark, Nicholas; Light, Sarah; Long, Rachael; Dahlquist-Willard, Ruth; Yang, Michael; Bullard, Valerie; Smither-Kopperl, Margaret; Matthews, William; Ploeg, Antoon; Close, Timothy; Roberts, Philip (2020). California Cowpea Blackeye-Grain, Vegetable and Cover Crop Improvement Program. California Agronomy Society of America. February. <https://ucanr.edu/sites/calasa/files/319847.pdf>
Role: Collaborator for Sutter County field locations.

October 1, 2020 to September 30th, 2022 [13 publications]

- Lundy, M; Nelson, T; Clark, N; Galdi, G; Getts, T; Leinfelder-Miles, M; Light, S; Mathesius, K. (2020). Achieving Efficient Nitrogen Fertilizer Management in California Wheat. CDFA Fertilizer Research and Education Program Proceedings. October.
https://www.cdfa.ca.gov/is/fldrs/frep/pdfs/Proceedings_2020.pdf
Role: contributed toward multi-year project that informed abstract.
- Koch, Geoff; Light, Sarah; Vinchesi-Vahl, Amber; Stoddard, C. Scott; Aegerter, Brenna; Leinfelder-Miles, Michelle; Mitchell, Jeffrey; Horwath, William (2020). Securing the Future of Highly Productive Annual Cropping Systems in California. Soil Science Society of America, Agronomy Society of America, Crop Science Society of America. November.
<https://scisoc.confex.com/scisoc/2020am/meetingapp.cgi/Paper/124554>
Role: contributed toward multi-year project that informed abstract.
- Kanter, Jessica; Clark, Nicholas E.; Lundy, Mark; Leinfelder-Miles, Michelle M.; Light, Sarah; Linqvist, Bruce; Brim-DeForest, Whitney; Putnam, Daniel H.; Pittelkow, Cameron M. (2020). Statewide Collaborative Needs Assessment for California Agronomy. Soil Science Society of America, Agronomy Society of America, Crop Science Society of America. November. <https://scisoc.confex.com/scisoc/2020am/meetingapp.cgi/Paper/127921>
Role: contributed toward project that informed abstract.
- Light, S; Mitchell, J; Araya, S; Ghezzehei, T (2021). Evaluating Soil Physical Properties in Response to Soil Management. Agronomy Society of America: California Chapter - California Plant and Soil Conference Proceedings. February.
<https://ucanr.edu/sites/calasa/files/352705.pdf>
Role: co-wrote abstract and led presentation.
- Kanter, Jessica; Clark, Nicholas; Lundy, Mark; Leinfelder-Miles, Michelle; Light, Sarah; Linqvist, Bruce; Long, Rachael; Koundinya, Vikram; Brim-DeForest, Whitney; Putnam, Dan; Hutmacher, Bob; Pittelkow, Cameron (2021). Statewide Collaborative Needs Assessment for California Agronomy. Agronomy Society of America: California Chapter - California Plant and Soil Conference Proceedings. February.
<https://ucanr.edu/sites/calasa/files/352705.pdf>
Role: contributed toward project that informed abstract.
- Mitchell, JM; Shrestha, A; Brenna, E; Daley, C; Chiartas, J; Altier, L; Lilies, G; Vinchesi-Vahl, A; Light, S; Park, S; Park, B; Muller, P; Brait, A; Foster, P; Willey, T; Wong, D; Siemens, N; Bozzolo, A (2021). Securing the future of highly productive organic no-till vegetable cropping systems in California. Soil and Water Conservation Society. July.
https://www.swcs.org/static/media/cms/Abstract_Book_1EE65CD438D41.pdf
Role: contributed toward project that informed abstract.
- Lundy, M; Nelson, T; Clark, N; Galdi, G; Getts, T; Leinfelder-Miles, M; Light, S; Mathesius, K.

- (2021). Achieving Efficient Nitrogen Fertilizer Management in California Wheat. CDFA Fertilizer Research and Education Program Proceedings. October.
https://www.cdfa.ca.gov/is/ffldrs/frep/pdfs/2021_proceedings_10222021.pdf
Role: contributed toward project that informed abstract.
- Geisseler, D; Parikh, S; Clark, N; Leinfelder-Miles, M; Light, S; Mathesius, K; Wilson, R. (2021). Development of site-specific nitrogen fertilization recommendations for annual crops. CDFA Fertilizer Research and Education Program Proceedings. October.
https://www.cdfa.ca.gov/is/ffldrs/frep/pdfs/2021_proceedings_10222021.pdf
Role: contributed toward project that informed abstract.
 - Hutmacher, R; Putnam, D; Light, S; Clark, C; Geisseler, D; Hotz, M; Koch, G; Angeles, J; DeBen, C. (2021). Nitrogen Response of Industrial Hemp Cultivars Grown for CBD, Essential Oils. CDFA Fertilizer Research and Education Program Proceedings. October.
https://www.cdfa.ca.gov/is/ffldrs/frep/pdfs/2021_proceedings_10222021.pdf
Role: contributed toward project that informed abstract.
 - Light, S; Harper, E (2021). Building an Interagency Collaboration to Increase Soil Health Outreach. Soil Science Society of America, Agronomy Society of America, Crop Science Society of America. Annual Meeting Proceedings. November.
<https://scisoc.confex.com/scisoc/2021am/meetingapp.cgi/Paper/138835>
Role: contributed toward project that informed abstract; wrote abstract.
 - Light, S; Clark, N; Nelsen, T; Galdi, G; Getts, T; Leinfelder-Miles, M; Mathesius, K; Lundy, M (2021). Remote Education and Demonstrations of Advanced Nitrogen Management Tools for Small Grains Growers in California. Soil Science Society of America, Agronomy Society of America, Crop Science Society of America. Annual Meeting Proceedings. November. <https://scisoc.confex.com/scisoc/2021am/meetingapp.cgi/Paper/138690>
Role: contributed toward project that informed abstract; co-wrote abstract.
 - Light, S; Hanson, B (2022). Herbicide Drift in Hemp. California Weed Science Society Proceedings. January. <https://www.cwss.org/wp-content/uploads/2022/07/Complete-Proceedings-Final-2022.pdf>
Role: co-led project that informed abstract; wrote abstract.
 - Light, S; Horwath, W; Koch, G; Mitchell, J; Suarez Romero, V; Vinchesi-Vahl, A (2022). Evaluation of Two Rates of Legume Winter Cover Crop on Soil Function in the Central Valley of California, USA. World Congress of Soil Science Proceedings. August.
Role: co-led project that informed abstract; wrote abstract.



Seasonal Net Nitrogen Mineralization in the Topsoil of Subsurface Drip Irrigated Fields

Suzette Santiago, Sarah E. Light, Nicholas E. Clark, Zheng Wang, Konrad Mathesius & Daniel Geissler

To cite this article: Suzette Santiago, Sarah E. Light, Nicholas E. Clark, Zheng Wang, Konrad Mathesius & Daniel Geissler (2023) Seasonal Net Nitrogen Mineralization in the Topsoil of Subsurface Drip Irrigated Fields, Communications in Soil Science and Plant Analysis, 54:5, 627-639, DOI: [10.1080/00103624.2022.2118305](https://doi.org/10.1080/00103624.2022.2118305)

To link to this article: <https://doi.org/10.1080/00103624.2022.2118305>



Published online: 31 Aug 2022.



Submit your article to this journal [↗](#)



Article views: 44




View related articles [↗](#)



View Crossmark data [↗](#)



Seasonal Net Nitrogen Mineralization in the Topsoil of Subsurface Drip Irrigated Fields

Suzette Santiago^a, Sarah E. Light^b, Nicholas E. Clark^c, Zheng Wang^d, Konrad Mathesius^e, and Daniel Geisseler ^a

^aDepartment of Land, Air and Water Resources, University of California, Davis, Davis, California, USA; ^bUniversity of California Cooperative Extension Sutter & Yuba Counties, Yuba City, California, USA; ^cUniversity of California Cooperative Extension Kings, Tulare & Fresno Counties, Hanford, California, USA; ^dUniversity of California Cooperative Extension Stanislaus, Merced and San Joaquin Counties, Modesto, California, USA; ^eUniversity of California Cooperative Extension Yolo, Solano & Sacramento Counties, Woodland, CA, USA

ABSTRACT

Nitrogen (N) mineralized from soil organic matter during the growing season can be an important source of crop-available N. However, accurate estimates for subsurface drip irrigated fields are currently not available. The main objective of the study was to determine seasonal net N mineralization rates in subsurface drip irrigated fields in California's Central Valley. Soil samples were collected regularly from the top 15 cm of eleven commercial fields during the growing season and subsamples were incubated at an optimal moisture content and at field moisture (soil moisture content at the time of sampling). Net N mineralization in field moist soil was on average 45% of the potential N mineralization. When corrected for daily soil temperature at the sites, net N mineralization during a 4-month period from April 15 to August 15 averaged 25.2 kg ha⁻¹ (median = 20.7 kg ha⁻¹), which corresponds to 10 to 20% of the N in the aboveground biomass of the crops grown in these fields. To achieve a high N use efficiency and limit the risk of nitrate leaching to the groundwater, net N mineralization from soil organic matter should be accounted for when planning N fertilizer applications.

ARTICLE HISTORY

Received 22 April 2022
Accepted 23 August 2022

KEYWORDS

Crop nitrogen uptake; net nitrogen mineralization; soil moisture; soil organic matter

Introduction

The nitrogen (N) use efficiency in crop production can be low, resulting in N losses to the environment (Lassaletta et al. 2014). Improved N use efficiency can increase farm profitability by reducing crop input costs as well as increase crop yield and quality. Additionally, with increasing regulatory pressure aiming at reducing nitrate contamination of groundwater, accurate determination of N fertilizer requirements by crops is crucial to minimize the risk of nitrate leaching to the groundwater, while maintaining high yields. Furthermore, avoiding excess N applications can also reduce gaseous losses of nitrous oxide, a potent greenhouse gas (Lassaletta et al. 2014). Reliable estimates of the availability of N from non-fertilizer sources are required to achieve high N use efficiency.

Net N mineralization from soil organic matter (SOM) during the growing season can be an important source of crop-available N and should be taken into account when planning site-specific N fertilizer applications. In a study conducted on poorly drained silty clay loams, Fernández, Fabrizzi, and Naeve (2017) found that N mineralization in the top 15 cm of the profile provided 76 kg N ha⁻¹ to corn. Ma, Dwyer, and Gregorich (1999) found that N mineralization in the top 20 cm of a loam contributed 130–170 kg N ha⁻¹ during the corn growing season. Similar values (96 to 120 kg N ha⁻¹) were reported from the top 20 cm by Wu, Ma, and Liang (2008) in a study on loams and sandy loams.

In these studies, the SOM content ranged from 2.5 to 5.2%. Mineral soils in the Central Valley of California tend to have a low SOM content, with total carbon (C) contents in the topsoil commonly below 2% (De Clerck, Singer, and Lindert 2003; Miller et al. 2018), which corresponds to a SOM content of 4% or less (Pribyl 2010). Even though summer temperatures are high in the Central Valley, N mineralization rates have been estimated to be at the lower end of those reported in the studies cited above. Based on a budget for organic N, Geisseler et al. (2019) estimated N mineralization rates of 35 to 60 kg ha⁻¹ in the top 30 cm of the profile for a 4-month summer growing season of furrow-irrigated crops.

Seasonal N mineralization rates can be determined using a sequential core sampling approach where undisturbed soil cores are taken regularly and incubated for several weeks in-situ. This approach has been used successfully to estimate seasonal N mineralization rates (Fernández, Fabrizzi, and Naeve 2017; Wu, Ma, and Liang 2008). However, temporal fluctuations in net N mineralization can be considerable, making it challenging to predict total net N mineralization during the growing season. Several factors can affect the temporal pattern of net N mineralization during the growing season, including temperature, soil moisture, wet-dry cycles, changes in the quality of soil organic material and priming effects due to the presence of active roots. Microbial activity, including N mineralization, increases with increasing temperature within the temperature range generally observed during the growing season of crops (Dessureault-Rompré et al. 2010). Using soil from the same region as in the present study, Miller and Geisseler (2018) found that the temperature response between 5 and 25°C followed a Q₁₀ function with a Q₁₀ value averaging 2.87, which means that the net N mineralization rate increased by a factor of 2.87 when the temperature increased by 10°C. As to soil moisture, net N mineralization generally is highest at a moisture content near field capacity and decreases with decreasing soil moisture (Paul et al. 2003). Furthermore, fluctuations in soil moisture can affect net N mineralization. Wetting of dry soil has been found to result in a pulse in net N mineralization (Borken and Matzner 2009). Recently incorporated crop residues, cover crops, and organic amendments can also affect N mineralization rates in the soil. They may increase or decrease net N mineralization based on their quality and C:N ratio (Geisseler et al. 2021; Ozores-Hampton 2012). Plant roots can increase microbial activity and the decomposition of SOM, an effect commonly called priming effect (Cheng, Kuzyakov, and Wright 2005; Dijkstra et al. 2009). The priming effect on N mineralization is highly dependent on environmental factors and cropping history and can range from strongly negative to strongly positive, resulting in decreasing and increasing N mineralization rates (Parkin, Kaspar, and Cambardella 2002). This brief overview of some of the major factors affecting N mineralization highlights the need for local studies to obtain accurate estimates of seasonal net N mineralization rates.

In California's Central Valley, crops are increasingly grown with subsurface drip irrigation, especially processing tomatoes and other annual crops commonly grown in rotation (Taylor and Zilberman 2017). In these systems, crop residues and organic amendments are incorporated shallowly above the drip tape. With the drip-tape located at a depth of 25–30 cm, the soil moisture content in the surface soil can decrease considerably during the growing season, potentially reducing net N mineralization from SOM and any incorporated organic material. However, as drip-irrigated crops are commonly irrigated frequently with relatively small amounts of water, fluctuations in net N mineralization due to wet-dry cycles are likely minimal (Barakat, Cheviron, and Angulo-Jaramillo 2016). Therefore, the N mineralization dynamics in the top soil of subsurface drip irrigated fields may differ from the dynamics in fields that are rainfed or irrigated with other systems where water infiltrates the soil vertically from the surface and where inputs are less frequent.

The objectives of the current study, conducted in subsurface drip irrigated fields, were (i) to determine how accurately seasonal net N mineralization totals can be predicted with net N mineralization rates measured in pre-plant soil samples; (ii) to determine the effect of soil moisture content on net N mineralization; and (iii) to determine the contribution of net N mineralization from SOM in the topsoil to crop-available N.

We hypothesized that (i) the net N mineralization rate during the growing season is well correlated with net N mineralization in soil sampled pre-plant; (ii) net N mineralization in field moist soil (defined here as the soil moisture content at the time of sampling) is limited by low soil moisture contents; and that (iii) net N mineralization in the surface soil corresponds to up to 20% of the total N in the aboveground biomass of the crops grown in these fields in the year of study.

Material and methods

Field sites and soil sampling

Eleven commercial fields with subsurface drip irrigation were selected for this study. All fields were located in the Central Valley of California (Table 1). From north to south, the maximal distance between sites was 315 km and from east to west 170 km. The fields had no recent history (at least 3 years) of legume cover crops or organic amendment applications. Processing tomatoes are an important crop in the rotation at all sites. Rotational crops in the study year included corn, sorghum, cotton and sunflowers (Table 1).

The initial pre-plant soil samples were collected between early March and early May in 2019 and 2020 before any application of fertilizer or irrigation water. Crop residues at the sites either had been incorporated in fall or were incorporated after the initial soil sampling, depending on growers' management practices. Four blocks were marked in each field and separate soil samples were taken from each block. The top hardened layer of soil (1–2 cm) and any plant material were first removed. Four cores from the top 15 cm of the profile were taken in each block with an auger for a composite sample. The cores were collected from across the bed. Throughout the growing season, samples were taken with an auger from the same blocks and soil layer every 5–6 weeks. Each site was sampled 5 to 6 times for a total of 58 samples across the 11 sites. Sampling dates were not chosen to avoid recent irrigation or fertigation events. All samples were kept on ice in coolers until returning to the laboratory where they were stored in a cold room at 4°C before processing.

Net N mineralization measurements

A common approach to determine the seasonal net N mineralization rates is to collect undisturbed soil cores in sleeves that are placed back in the hole to incubate them in-situ. For the present study, we chose to incubate the samples in an incubator at 25°C. This allowed us to incubate subsamples at different moisture contents. To correct for differences in temperature between the soil in the field and the incubators, daily soil temperature (T) measured at a depth of 15 cm at the weather stations nearest to the field sites and a temperature correction factor (TFAC) were used (Eq. (1)). The equation for

Table 1. Location and cropping history of the field sites included in this study. Within each year, the sites are arranged from north to south.

Site ID	Year sampled	Coordinates	Soil Series	Previous Year's Crop	Crop in Study Year
1	2019	39.15, -121.95	Vina loam	Wheat	Tomatoes
2	2019	38.85, -121.75	Sycamore silty clay loam	Corn	Sorghum
3	2019	38.55, -121.75	Yolo silt loam	Tomatoes	Tomatoes
4	2019	37.50, -121.10	Capay clay	Cantaloupe	Tomatoes
5	2019	36.40, -120.10	Calflax clay loam	Cotton	Cotton
6	2019	36.35, -120.10	Cerini clay loam	Tomatoes	Tomatoes
7	2020	39.20, -122.00	Vina loam	Sunflower	Corn
8	2020	39.10, -121.95	Vina loam	Sunflower	Corn
9	2020	39.20, -122.00	Moonbend silt loam	Tomatoes	Sunflower
10	2020	37.50, -121.10	Capay clay	Tomatoes	Tomatoes
11	2020	37.50, -121.10	Capay clay	Tomatoes	Tomatoes

TFAC. was developed with undisturbed cores sampled from fields in the same region (Miller and Geisseler 2018). The value for TFAC is 1 at 25 °C.

$$TFAC = 2.419e^{-3.523\left(1 - \frac{T}{50}\right)^2} \quad (1)$$

The samples were sieved to 4 mm and analyzed for soil moisture content and baseline mineral N concentrations (sum of ammonium-N and nitrate-N concentrations; for methods see *Soil Analyses* below). A 4-mm sieve was chosen to minimize disturbance, which may affect net N mineralization. A comparison with net N mineralization rates in undisturbed soil cores, which were collected from the same sites pre-plant for a related study and incubated under the same conditions, indicated that sieving had no significant effect on the daily net N mineralization rates (data not shown). For the current study, 6-g subsamples from each block and sampling date were weighed into 50-mL centrifuge tubes. One subsample was maintained at field moisture (defined here as the soil moisture content at the time of sampling), while the other was adjusted to 60% water holding capacity (WHC) with deionized (DI) water to provide optimal moisture conditions for microbial activity and net N mineralization (Linn and Doran 1984). Both subsamples were then placed in a plastic bin, which was lined with moist paper towels, and incubated in an incubator set to 25°C for 5 weeks. The moisture content of the soil samples was monitored weekly and adjusted by adding DI water to maintain the target moisture content during the incubation. After 5 weeks, the samples were analyzed for mineral N concentrations. Net N mineralization in all incubated samples was calculated by subtracting the initial mineral N from the final mineral N concentration. The net N mineralization in the samples kept at 60% WHC will be referred to as potential mineralization in this paper. The term potential is used with respect to soil moisture in these samples. However, it needs to be mentioned that net N mineralization does not reach its potential rate at a temperature of 25°C. In fact, net N mineralization has been found to increase up to a temperature of 50°C (Beck 1983). After correction for soil temperature in the field, the net N mineralization at field moisture will be referred to as actual net N mineralization.

The remainder of the pre-plant samples was air-dried at room temperature. The dry samples were then used to characterize the soil at each site.

Soil analyses

Samples were analyzed for gravimetric water content by drying a subsample at 105°C for 24 h. Water-holding capacity corresponds to the gravimetric water content of a soil sample in a filter-paper lined funnel that was first saturated with water and then let drain freely for 1 h (Miller et al. 2018).

Mineral N was extracted with 0.5 M potassium sulfate and measured colorimetrically on a Shimadzu UV1820 Spectrophotometer. The ammonium-N concentration was determined using the salicylate method (Forster and Alef 1995; Verdouw, van Echteld, and Dekkers 1978), while nitrate-N was measured using a single reagent method (Doane and Horwath 2003). Electrical conductivity (EC) and pH were measured in a 2:1 DI water:soil suspension (w:w; Thomas and Sparks 1996). Particle-size analysis was performed using the pipet method (Soil Survey Staff 2014). Total C and N were analyzed using dry combustion analysis with a Costech Elemental Combustion System (ECS 4010; Nelson, Sommers, and Sparks 1996). Bulk density was determined in undisturbed soil cores collected at the first pre-plant sampling date from the same soil layer.

Data analysis

Cumulative net N mineralization during the growing season was calculated by first multiplying the average daily net N mineralization during an incubation by the number of days until the next sampling event. The totals for the different periods were then added. Cumulative net N mineralization rates were calculated for each block separately, before calculating the average for each site. For a better

comparison across sites, the total net N mineralization for a 4-month season from April 15 to August 15 was calculated. This 4-month period corresponds to a typical growing season for processing tomatoes in the region. Net N mineralization rates were converted from mg kg^{-1} to kg ha^{-1} using the bulk density measured at each site.

Statistical analyses were done using the SAS software system, version 9.4 (SAS Institute Inc 2013). Multiple linear regression was performed using the “REG” procedure. The models were grouped based on the number of variables included and within each group arranged based on Mallows' C_p , which was used for model selection. Variables included in the model were soil moisture content, either as gravimetric moisture content or % WHC, as well as sand, silt, clay, total C, total N, C:N ratio, EC and pH measured in the samples taken pre-plant.

Results

Soil properties in the top 15 cm of the profile

The soils at the sites covered a wide range of particle size distributions, with sand contents ranging from 1.1 to 67.9% and clay contents from 16.2 to 49.0% (Table 2). The EC increased from north to south, reflecting the decreasing winter precipitation. Total N ranged from 0.83 to 1.51 g kg^{-1} , and total C from 7.4 to 14.4 g kg^{-1} , corresponding to SOM contents of approximately 1.5 to 3.0% (Pribyl 2010). The pH was typical for soils in the area with values ranging from 7.2 to 7.8.

Soil mineral N at the time of sampling ranged from 2 to 36 mg kg^{-1} soil (data not shown). It fluctuated widely over time at most sites, which reflects the fact that the crops were fertilized through the drip tape several times during the growing season and the dates for soil sampling were not chosen to avoid recent fertigation events. Overall, the mineral N content slightly decreased during the season across all sites ($p = 0.068$). The decrease was 0.28 mg N kg^{-1} soil per week (data not shown).

Seasonal pattern in potential net N mineralization

Potential net N mineralization was determined at optimal moisture content and 25°C. The potential net N mineralization rates across all sites and sampling dates ranged from 0.04 to 0.62 $\text{mg kg}^{-1} \text{d}^{-1}$ (Figure 1). These values correspond to 0.09 to 1.47 $\text{kg ha}^{-1} \text{d}^{-1}$ in the top 15 cm of the profile. The variability was high across sampling dates at the same site, with the coefficient of variation (CV) ranging from 12 to 53% for individual sites, averaging 28.9%. No clear temporal pattern emerged. At some sites, the highest net N mineralization rate was measured pre-plant or during the early stages of crop growth, while at other sites, it occurred mid-season. Temporal variability in potential net N mineralization rates were observed under tomatoes as well as other crops (Figure 1).

Table 2. Soil properties in the top 15 cm of the soil profile at the field sites included in this study.

Site ID	Sand %	Clay %	Bulk density g cm^{-3}	pH	EC dS m^{-1}	Total N g kg^{-1}	Total C g kg^{-1}	C:N ratio
1	67.9	18.0	1.49	7.2	0.26	0.83	7.8	9.4
2	1.1	49.0	1.15	7.6	0.50	1.38	13.2	9.6
3	23.5	28.9	1.35	7.8	0.33	0.97	9.0	9.3
4	23.2	45.9	1.42	7.6	0.70	1.24	10.4	8.4
5	30.6	45.3	1.32	7.8	2.78	0.95	8.7	9.2
6	35.5	34.6	1.35	7.7	3.92	0.84	7.4	8.8
7	16.3	28.4	1.21	7.2	0.59	1.51	14.4	9.5
8	32.5	16.2	1.22	7.3	0.47	1.02	8.4	8.2
9	37.8	17.2	1.25	7.3	0.44	1.14	9.2	8.1
10	24.4	36.2	1.29	7.7	0.90	1.12	8.6	7.7
11	19.8	36.2	1.33	7.8	0.79	1.21	9.4	7.8

Note: EC represents electrical conductivity; N represents nitrogen and C represents carbon.

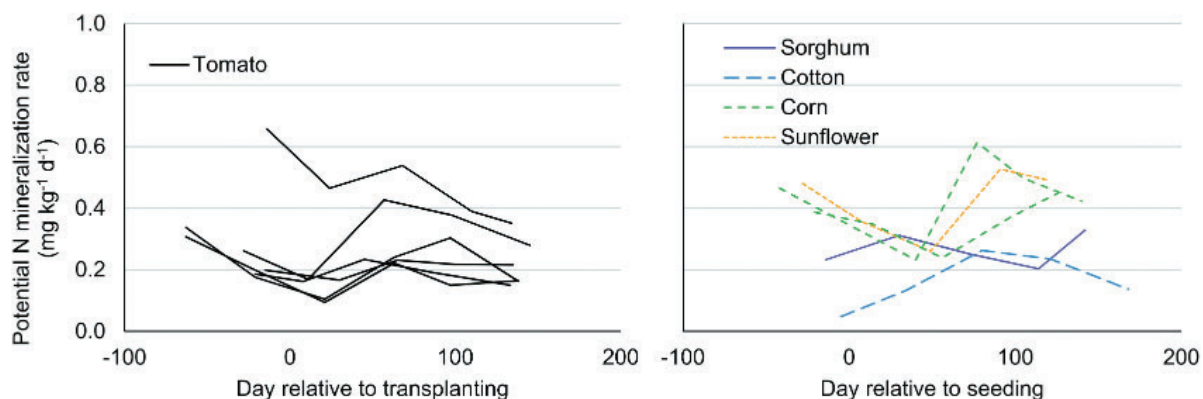


Figure 1. Potential net nitrogen (N) mineralization at 25°C. Samples were incubated for five weeks at a moisture content corresponding to 60% water holding capacity. Negative x-values refer to samples taken pre-plant.

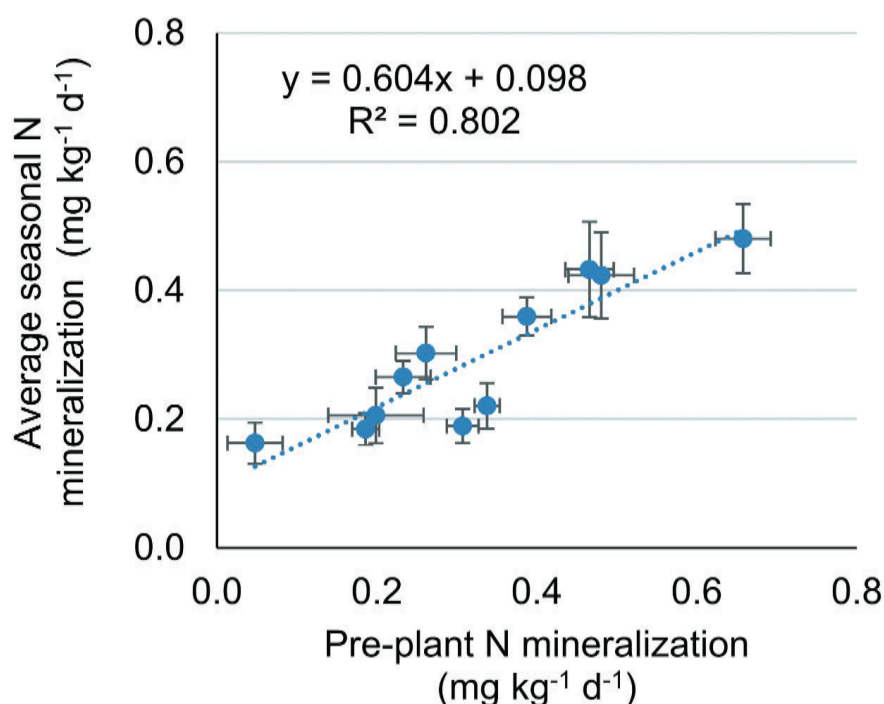


Figure 2. Correlation between potential net nitrogen (N) mineralization in pre-plant samples and the average across the entire season. All incubations were carried out at 25°C and optimal moisture content (60% water holding capacity). Error bars are standard error of the means ($n=4$).

Relationship between pre-plant and seasonal average potential net mineralization

Despite the temporal variability in potential net N mineralization, the pre-plant net N mineralization rates were well correlated with the seasonal average (Figure 2). The seasonal average potential net N mineralization rate at 25°C was $0.29 \text{ mg kg}^{-1} \text{ d}^{-1}$ across all sites, corresponding to $0.57 \text{ kg ha}^{-1} \text{ d}^{-1}$ in the top 15 cm of the profile. With $0.32 \text{ mg kg}^{-1} \text{ d}^{-1}$ ($0.64 \text{ kg ha}^{-1} \text{ d}^{-1}$), the net N mineralization in the pre-plant samples exceeded the season average by 10%. The range in seasonal net N mineralization rates was smaller than for pre-plant samples. This is likely because the seasonal rates represent the average of several sampling dates, while the pre-plant rates were determined based on one, or at a few sites where planting was delayed, on two sampling dates only.

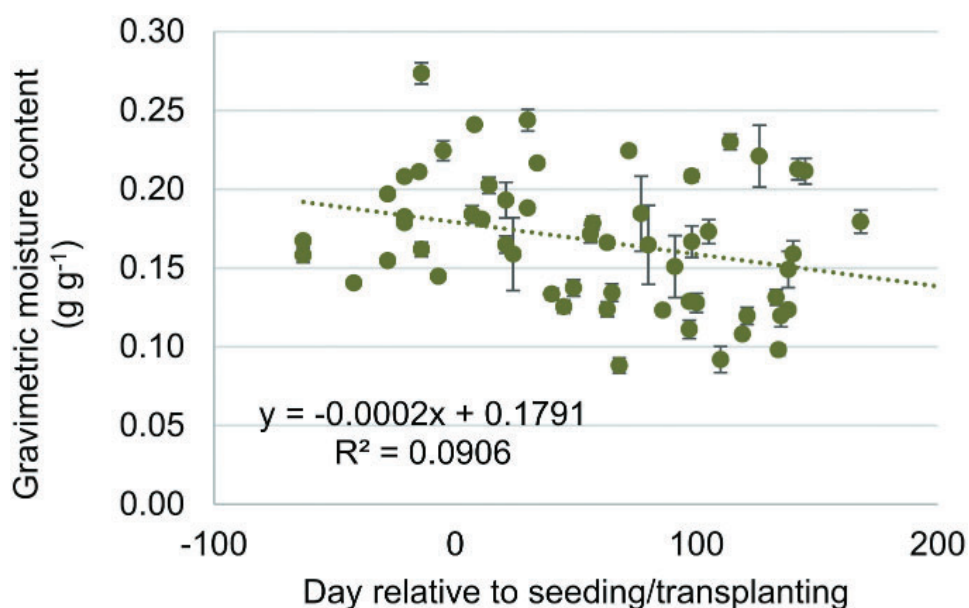


Figure 3. Change in gravimetric soil moisture content during the season, across all 11 sites. Negative x-values refer to samples taken pre-plant. Error bars are standard error of the means (n = 4).

Seasonal variability in soil moisture

In the pre-plant samples, the gravimetric soil moisture content ranged from 0.14 to 0.27 g g⁻¹. In the same samples, which corresponded to 29 to 56% of their WHC. Soil moisture decreased significantly during the growing season (p = 0.023). However, across all sites the decrease was only 0.024 g g⁻¹ soil over a 4-month period, which corresponds to an average decrease of 12.7% from the initial moisture content (Figure 3). The gravimetric moisture content varied moderately over time at individual sites, with the average CV being 19%. Therefore, the temporal variability in soil moisture was smaller than the variability in potential net N mineralization.

Effect of soil moisture on net N mineralization

The relative net N mineralization was calculated as the net N mineralization at field moisture, divided by the net N mineralization at 60% WHC. Relative net N mineralization averaged 0.45 across all sites, ranging from 0.35 to 0.57 for individual sites.

Gravimetric moisture content in the field moist samples, expressed as percent WHC, explained 51.4% of the variability in relative net N mineralization across all sites and sampling dates (p < 0.001; Figure 4). In addition, the relative net N mineralization was a significantly negatively correlated with soil C:N ratio and pH. Together, these three variables explained 60% of the variability in relative net N mineralization. Adding clay, silt, sand, EC, total C and total N contents did not improve the regression model, while the R² with all these variables reached 0.65.

Relative net N mineralization was also positively correlated with gravimetric soil moisture content (R² = 0.193; p < 0.001). The correlation was less close compared to WHC, which is not surprising, as the gravimetric moisture content that is optimal for soil microbial activity depends on soil particle size distribution and SOM content. When percent WHC was replaced with gravimetric moisture content in the regression model, the best model for relative net N mineralization reached an R² of 0.54, with gravimetric moisture content, C:N ratio, sand, silt and clay contents as predictor variables.

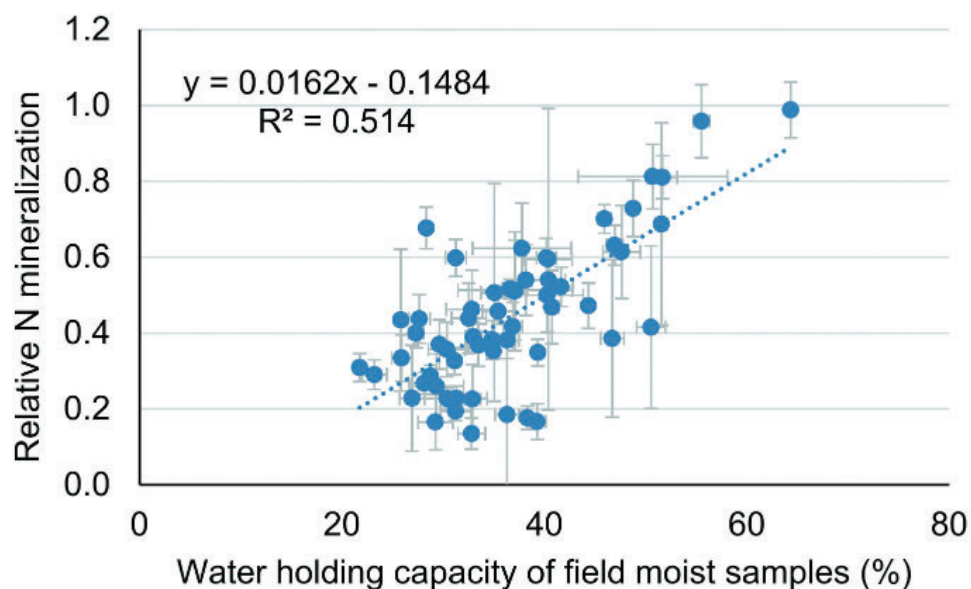


Figure 4. Correlation between soil moisture content in the samples incubated, expressed as percent of their water holding capacity, and relative net nitrogen (N) mineralization, which is the ratio between net N mineralization in samples incubated at optimal soil moisture content and samples incubated at field moisture content (the soil moisture content at the time of sampling). Error bars are standard error of the means ($n=4$).

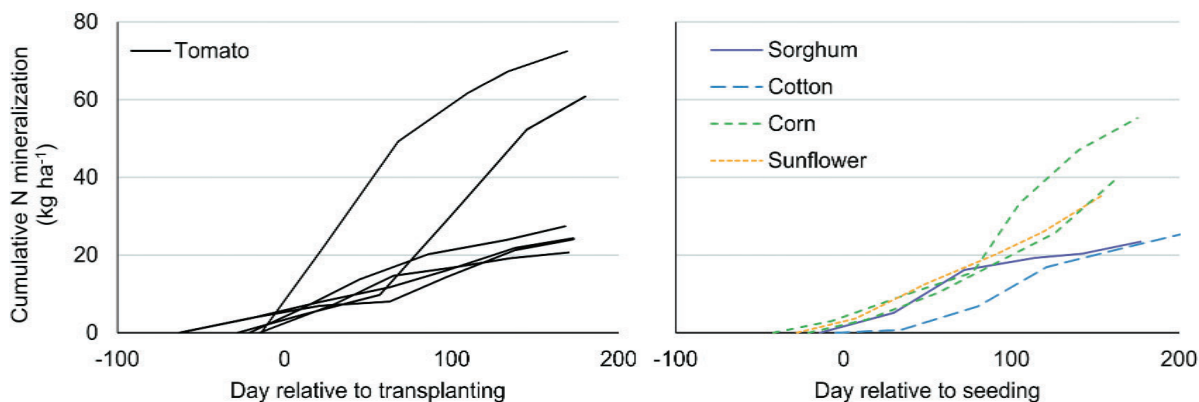


Figure 5. Temperature and moisture adjusted cumulative net nitrogen (N) mineralization during the growing season. The first samples were collected pre-plant, the last samples prior to harvest. Negative x-values refer to samples taken pre-plant.

Actual net N mineralization totals

Correcting the daily net N mineralization at field moisture with the daily average soil temperature resulted in actual net N mineralization totals ranging from 20 to 72 kg ha⁻¹ (Figure 5). As was the case with potential net N mineralization, the actual net N mineralization was highest early in the season at some sites, resulting in steep increases in net N mineralization, while at other sites net N mineralization was highest late in the season resulting in an acceleration in net N mineralization over time.

The period of observation differed considerably across sites, ranging from 182 to 236 days. To facilitate the comparison of net N mineralization rates across sites, the actual net N mineralization was calculated for a 4-month period from April 15 to August 15. During this period, the actual net N mineralization total in the top 15-cm layer ranged from 11.1 to 55.9 kg ha⁻¹ (Figure 6). Low soil moisture reduced net N mineralization to 49% of the potential during this period across all sites, meaning that the relative net N mineralization was 0.49. During this 4-month period, the average soil

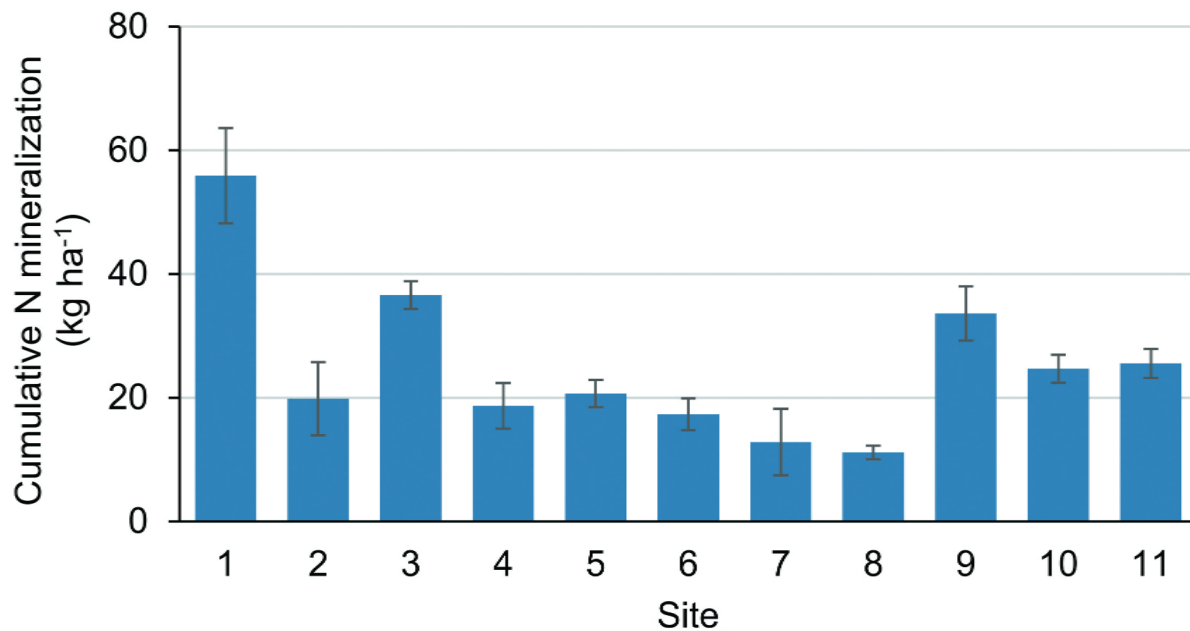


Figure 6. Temperature and moisture adjusted total net nitrogen (N) mineralization from April 15 to August 15, which is a common growing season for processing tomatoes in the region. Error bars are standard error of the means at each site. ($n = 4$).

temperature at the different sites ranged from 20.2 to 22.8°C. The daily values for TFAC ranged from 0.36 to 1.19, averaging 0.76. As the temperature was close to the incubation temperature at 25°C, the temperature adjustment had less effect on net N mineralization rates than soil moisture. Across all sites, the actual net N mineralization rate was 37% of the potential net N mineralization rate.

Discussion

Seasonal pattern of net N mineralization

The average potential net N mineralization rate during the season was well correlated with the net N mineralization rate in samples collected pre-plant, supporting our first hypothesis. Therefore, seasonal net N mineralization rates in the topsoil of subsurface drip irrigated fields can be estimated with incubations of soil samples collected pre-plant. However, across all sites, potential net N mineralization did not follow a uniform pattern over time. At some sites, net N mineralization rates were highest in the pre-plant samples; this effect was most prominent at site 1, which also had the highest potential and cumulative net N mineralization of all sites. This site had low total C and N contents, but the highest weed density in spring (data not shown). It is possible that the decomposition of the weed roots and aboveground biomass increased net N mineralization in spring. Furthermore, while the SOM content was low, organic material may have been less protected by soil minerals and aggregates due to the high sand content. Studies have found that disturbance (e.g. sieving) has the strongest effect on net N mineralization in sandy soils (Franzluebbers and Arshad 1997; Moberg, Johnson, and Sullivan 2013). All these factors may have contributed to the high net N mineralization rates observed in spring at site 1.

Other sites had high net N mineralization rates late in the season. A potential reason for this observation are priming effects due to active plant roots (Cheng, Kuzyakov, and Wright 2005; Dijkstra et al. 2009). High net N mineralization rates during the grain filling stages of corn are in line with Wu, Ma, and Liang (2008). However, other studies found high net N mineralization rates during vegetative growth of corn (Fernández, Fabrizzi, and Naeve 2017; Ma, Dwyer, and Gregorich 1999) or at silking (Zhang et al. 2015). In our study, high net N mineralization rates late in the season were only observed

in one of the two corn fields (site 8) and one out of six processing tomato fields (site 3). It is interesting to note that the other corn field (site 7) was located in a field near site 8 and had the same soil series and previous crop. Despite these similarities, the seasonal net N mineralization pattern was quite different. Therefore, our data do not suggest that the growth stage or type of crop had a strong and predictable effect on net N mineralization.

Effect of soil moisture

Soil moisture content had a strong effect on net N mineralization. This result supports our second hypothesis that net N mineralization in field moist soil would be limited by low soil moisture contents. However, low soil moisture contents limit microbial activity less than plants. Based on measured soil properties and soil water characteristics estimates developed by Saxton and Rawls (2006), the gravimetric moisture content at 1,500 kPa, which is generally considered the permanent wilting point, ranged from 0.08 to 0.24 g g⁻¹ at the different sites. Across all sites, the average field moisture was only slightly above the permanent wilting point. While plant growth would be minimal at that moisture content, net N mineralization in field moist soil still reached on average 45% of the potential net N mineralization. An equation developed by Paul et al. (2003, equation 3), which is based on 390 data points from 29 sites, predicts that net N mineralization is 42% of its maximum when the soil reaches the permanent wilting point. Therefore, our data agrees well with Paul et al. (2003).

In a study where soil moisture in furrow-irrigated fields in California's Central Valley was modeled for the top 30 cm, Geisseler et al. (2019) found that soil temperatures below 25°C and suboptimal moisture limited net N mineralization during a 4-month growing season to 70% of the rate at 25°C and optimal moisture content. In that study, differences in soil temperature contributed more to the temporal pattern than soil moisture. In the current study, actual net N mineralization in the top 15 cm reached only 37% of the potential net N mineralization with soil moisture having a much more pronounced effect on net N mineralization than soil temperature. This comparison highlights the strong effects of irrigation system on net N mineralization rates.

Contribution of net N mineralization to crop available N

Across the 11 sites, net N mineralization during a 4-month period from mid-April to mid-August averaged 25.2 kg ha⁻¹, ranging from 11.1 to 55.9 kg ha⁻¹. Our study suggests that net N mineralization from SOM is generally smaller in these subsurface drip irrigated fields with a relatively low SOM content than what was reported in other studies (Fernández, Fabrizzi, and Naeve 2017; Ma, Dwyer, and Gregorich 1999; Wu, Ma, and Liang 2008). As mentioned above, low soil moisture in the topsoil was a major factor contributing to the low actual net N mineralization totals. In a previous study with sites from the same region and similar crop rotations, Geisseler et al. (2019) estimated net N mineralization rates of 37 to 60 kg ha⁻¹ in the top 30 cm of the profile for the period from mid-April to mid-August under furrow irrigation. However, the results from that study cannot be compared directly with the current results. The two studies investigated different depths and the vertical pattern of net N mineralization in the top 30 cm of the profile is determined by several site-specific factors that differ between subsurface drip and furrow irrigation. Potential net N mineralization likely decreases more with depth in subsurface drip irrigated soil, as crop residues tend to be incorporated more shallowly to avoid damaging the drip tape, which is generally located 25–30 cm beneath the bed surface.

The vertical pattern of the actual net N mineralization rate during the growing season, however, is also affected by soil moisture and temperature. Soil moisture considerably increases with depth in subsurface drip irrigated fields. In contrast, the low moisture content in the topsoil results in higher temperatures during the growing season (Bell et al. 1998). Therefore, while the moisture distribution favors microbial activity and thus net N mineralization in the subsoil, the temperature distribution has the opposite effect. Therefore, the vertical pattern in net N mineralization will depend on soil

properties and management, including irrigation frequency. Both, the temperature and moisture gradient are generally more pronounced with subsurface drip irrigation compared to furrow irrigation. How much different soil layers contribute to the total net N mineralization needs to be investigated in future studies.

The amount of N in the aboveground biomass of tomatoes with a California average yield of 112 Mg ha⁻¹ is approximately 250 kg N ha⁻¹ (Geisseler et al. 2020). Therefore, the amount of N supplied during the growing season through net N mineralization corresponded to between 4 and 22% of the N in the aboveground biomass, averaging 10%. The rotational crops grown in the fields during the sampling years tend to accumulate less N in the aboveground biomass than processing tomatoes. Average values reported for well-fertilized Pima cotton (Fritschi et al. 2004), grain sorghum (Sindelar et al. 2016), corn (Kramer et al. 2002) and sunflower (Narem 1982) are 124, 189, 198 and 218 kg N ha⁻¹, respectively. For these crops, the average seasonal net N mineralization across the 11 sites (25.2 kg ha⁻¹) corresponds to 12–20% of the aboveground biomass N. We hypothesized that net N mineralization in the top soil during the growing season corresponds to up to 20% of the total N in the aboveground biomass of the crops grown in these fields. With the exception of site 1, the data support the hypothesis for tomatoes, sorghum, corn and sunflower. In the case of cotton, net N mineralization at site 5, where it was grown, contributed 15% of the estimated N in the aboveground biomass. However, the seasonal net N mineralization exceeded 20% of the biomass N at 5 of the 11 sites. The comparison with biomass N shows that net N mineralization should be taken into account when planning N fertilizer application rates in order to achieve high fertilizer N use efficiencies.

Conclusions

Our data show that net N mineralization in the top 15 cm of drip irrigated fields is strongly limited by soil moisture during the growing season. In contrast, the effect of soil temperature is much less pronounced. Priming effects caused by active roots had no apparent effect on the seasonal net N mineralization pattern. During a 4-month growing season, cumulative net N mineralization averaged 25.2 kg ha⁻¹, which corresponds to 10–20% of the N in the aboveground biomass of the crops grown in the fields investigated. To achieve a high N use efficiency and limit the risk of nitrate leaching and nitrous oxide emissions, net N mineralization should be taken into account when planning N fertilizer applications. The potential net N mineralization rate during the growing season was well correlated with the net N mineralization in pre-plant samples. As the samples were incubated for 5 weeks, this pre-plant net N mineralization test is a valuable approach for research purposes, but may not be a popular method for commercial soil test labs. Ongoing efforts focus on developing robust site-specific estimates of seasonal net N mineralization totals based on soil properties and crop management. In the absence of site-specific estimates, a valid approach to limit the risk of N losses while maintaining a high yield level is to use an average net N mineralization value for planning purposes and correct in-season applications based on plant tissue analyses and soil nitrate testing.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This study was supported by the University of California Agriculture and Natural Resources [Award 17-4993].

ORCID

Daniel Geisseler  <http://orcid.org/0000-0002-5483-9982>

References

- Barakat, M., B. Cheviron, and R. Angulo-Jaramillo. 2016. Influence of the irrigation technique and strategies on the nitrogen cycle and budget: A review. *Agricultural Water Management* 178:225–38. doi:10.1016/j.agwat.2016.09.027.
- Beck, T. 1983. Die N-mineralisierung von Böden im Laborversuch. *Zeitschrift Für Pflanzenernährung Und Bodenkunde* 146 (2):243–52. doi:10.1002/JPLN.19831460213.
- Bell, A. A., L. Liu, B. Reidy, R. M. Davis, and K. V. Subbarao. 1998. Mechanisms of subsurface drip irrigation-mediated suppression of lettuce drop caused by *Sclerotinia minor*. *Phytopathology* 88 (3):252–59. doi:10.1094/PHYTO.1998.88.3.252.
- Borken, W., and E. Matzner. 2009. Reappraisal of drying and wetting effects on C and N mineralization and fluxes in soils. *Global Change Biology* 15:808–24. doi:10.1111/j.1365-2486.2008.01681.x.
- Cheng, W., and Y. Kuz'yakov. 2005. Root effects on soil organic matter decomposition. In *Roots and soil management: Interactions between roots and the soil*, eds. S. Wright and R. Zobel, 119–143. Agronomy Monograph No. 48. ASA, Madison. 10.2134/agronmonogr48.c7.
- De Clerck, F., M. J. Singer, and P. Lindert. 2003. A 60-year history of California soil quality using paired samples. *Geoderma* 114:215–30. doi:10.1016/S0016-7061(03)00042-9.
- Dessureault-Rompré, J., B. J. Zebarth, A. Georgallas, D. L. Burton, C. A. Grant, and C. F. Drury. 2010. Temperature dependence of soil nitrogen mineralization rate: Comparison of mathematical models, reference temperatures and origin of the soils. *Geoderma* 157:97–108. doi:10.1016/j.geoderma.2010.04.001.
- Dijkstra, F. A., N. E. Bader, D. W. Johnson, and W. Cheng. 2009. Does accelerated soil organic matter decomposition in the presence of plants increase plant N availability? *Soil Biology & Biochemistry* 41:1080–87. doi:10.1016/j.soilbio.2009.02.013.
- Doane, T. A., and W. R. Horwath. 2003. Spectrophotometric determination of nitrate with a single reagent. *Analytical Letters* 36:2713–22. doi:10.1081/AL-120024647.
- Fernández, F. G., K. P. Fabrizzi, and S. L. Naeve. 2017. Corn and soybean's season-long in-situ nitrogen mineralization in drained and undrained soils. *Nutrient Cycling in Agroecosystems* 107:33–47. doi:10.1007/s10705-016-9810-1.
- Forster, J. C. 1995. Soil sampling, handling, storage and analysis. In *Methods in applied soil microbiology and biochemistry*, ed. K. Alef, and P. Nannipieri, 49–121. Academic Press, San Diego. doi:10.1016/B978-012513840-6/50018-5.
- Franzleubbers, A. J., and M. A. Arshad. 1997. Soil microbial biomass and mineralizable carbon of water-stable aggregates. *Soil Science Society of America Journal* 61:1090–97. doi:10.2136/sssaj1997.03615995006100040015x.
- Fritsch, F. B., B. A. Roberts, R. L. Travis, D. W. Rains, and R. B. Hutmacher. 2004. Seasonal nitrogen concentration, uptake, and partitioning pattern of irrigated acala and pima cotton as influenced by nitrogen fertility level. *Crop Science* 44:516–27. doi:10.2135/cropsci2004.5160.
- Geisseler, D., B. J. Aegerter, E. M. Miyao, T. Turini, and M. D. Cahn. 2020. Nitrogen in soil and subsurface drip-irrigated processing tomato plants (*Solanum lycopersicum* L.) as affected by fertilization level. *Scientia Horticulturae* 261:108999. doi:10.1016/j.scienta.2019.108999.
- Geisseler, D., K. Miller, B. J. Aegerter, N. E. Clark, and E. M. Miyao. 2019. Estimation of annual soil nitrogen mineralization rates using an organic-nitrogen budget approach. *Soil Science Society of America Journal* 83:1227–35. doi:10.2136/sssaj2018.12.0473.
- Geisseler, D., R. Smith, M. Cahn, and J. Muramoto. 2021. Nitrogen mineralization from organic fertilizers and composts: Literature survey and model fitting. *Journal of Environmental Quality* 50:1325–38. doi:10.1002/jeq2.20295.
- Kramer, A. W., T. A. Doane, W. R. Horwath, and C. van Kessel. 2002. Combining fertilizer and organic inputs to synchronize N supply in alternative cropping systems in California. *Agriculture, Ecosystems & Environment* 91:233–43. doi:10.1016/S0167-8809(01)00226-2.
- Lassaletta, L., G. Billen, B. Grizzetti, J. Anglade, and J. Garnier. 2014. 50 year trends in nitrogen use efficiency of world cropping systems: The relationship between yield and nitrogen input to cropland. *Environmental Research Letters* 9:105011. doi:10.1088/1748-9326/9/10/105011.
- Linn, D. M., and J. W. Doran. 1984. Effect of water-filled pore space on carbon dioxide and nitrous oxide production in tilled and nontilled soils. *Soil Science Society of America Journal* 48:1267–72. doi:10.2136/sssaj1984.03615995004800060013x.
- Ma, B. L., L. M. Dwyer, and E. G. Gregorich. 1999. Soil nitrogen amendment effects on seasonal nitrogen mineralization and nitrogen cycling in maize production. *Agronomy Journal* 91:1003–09. doi:10.2134/agronj1999.9161003x.
- Miller, K., B. J. Aegerter, N. E. Clark, M. Leinfelder-Miles, E. M. Miyao, R. Smith, R. Wilson, and D. Geisseler. 2018. Relationship between soil properties and nitrogen mineralization in undisturbed soil cores from California agroecosystems. *Communications in Soil Science & Plant Analysis* 50 (1):77–92. doi:10.1080/00103624.2018.1554668.
- Miller, K. S., and D. Geisseler. 2018. Temperature sensitivity of nitrogen mineralization in agricultural soils. *Biology & Fertility of Soils* 54:853–60. doi:10.1007/s00374-018-1309-2.
- Moberg, D. P., R. L. Johnson, and D. M. Sullivan. 2013. Comparison of disturbed and undisturbed soil core methods to estimate nitrogen-mineralization rates in manured agricultural soils. *Communications in Soil Science & Plant Analysis* 44:1722–32. doi:10.1080/00103624.2013.783060.

- Narem, R. A. 1982. Nitrogen fertility requirements, dry matter production and nutrient uptake of the sunflower. MS thesis., South Dakota State University.
- Nelson, D. W., and L. E. Sommers. 1996. Total carbon, organic carbon, and organic matter. In *Methods of soil analysis part 3 - Chemical methods*, ed. D.L. Sparks, 971–1010. ASA, SSSA, Madison. 10.2136/sssabookser5.3.c34.
- Ozores-Hampton, M. 2012. Developing a vegetable fertility program using organic amendments and inorganic fertilizers. *HortTechnology* 22:743–50. doi:10.21273/HORTTECH.22.6.743.
- Parkin, T. B., T. C. Kaspar, and C. Cambardella. 2002. Oat plant effects on net nitrogen mineralization. *Plant & Soil* 243:187–95. doi:10.1023/A:1019949727575.
- Paul, K. I., P. J. Polglase, A. M. O'Connell, J. C. Carlyle, P. J. Smethurst, and P. K. Khanna. 2003. Defining the relation between soil water content and net nitrogen mineralization. *European Journal of Soil Science* 54:39–48. doi:10.1046/j.1365-2389.2003.00502.x.
- Pribyl, D. W. 2010. A critical review of the conventional SOC to SOM conversion factor. *Geoderma* 156:75–83. doi:10.1016/j.geoderma.2010.02.003.
- SAS Institute Inc. 2013. *Base SAS® 9.4 procedures guide: Statistical procedures*. 2nd ed. Cary, NC: SAS Institute Inc.
- Saxton, K. E., and W. J. Rawls. 2006. Soil water characteristic estimates by texture and organic matter for hydrologic solutions. *Soil Science Society of America Journal* 70:1569–78. doi:10.2136/sssaj2005.0117.
- Sindelar, A. J., M. R. Schmer, V. L. Jin, B. J. Wienhold, and G. E. Varvel. 2016. Crop rotation affects corn, grain sorghum, and soybean yields and nitrogen recovery. *Agronomy Journal* 108:1592–602. doi:10.2134/agronj2016.01.0005.
- Soil Survey Staff. 2014. Kellogg soil survey laboratory methods manual. Soil Survey Investigations Report No. 42, Version 5.0. Accessed December 17, 2021. https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253871.pdf.
- Taylor, R., and D. Zilberman. 2017. Diffusion of drip irrigation: The case of California. *Applied Economic Perspectives & Policy* 39:16–40. doi:10.1093/aep/39/ppw026.
- Thomas, G. W. 1996. Soil pH and soil acidity. In *Methods of soil analysis. Part 3. Chemical methods*, ed. D.L. Sparks, 475–490. ASA, SSSA, 10.2136/sssabookser5.3.c16.
- Verdouw, H., C. J. van Echteld, and E. M. J. Dekkers. 1978. Ammonia determination based on indophenol formation with sodium salicylate. *Water Research* 12:399–402. doi:10.1016/0043-1354(78)90107-0.
- Wu, T. Y., B. L. Ma, and B. C. Liang. 2008. Quantification of seasonal soil nitrogen mineralization for corn production in eastern Canada. *Nutrient Cycling in Agroecosystems* 81 (3):279–90. doi:10.1007/s10705-007-9163-x.
- Zhang, X., Q. Wang, J. Xu, F. S. Gilliam, N. Tremblay, and C. Li. 2015. In situ nitrogen mineralization, nitrification, and ammonia volatilization in maize field fertilized with urea in Huanghuaihai Region of Northern China. *PLoS ONE* 10 (1):e0115649. doi:10.1371/journal.pone.0115649.

Sarah Light - Summary of Publication Examples: 2023

1. Light, S; Lloyd, M; Berris, H; Stewart, D; Goodrich, B. (2022). Estimate Costs for a Winter Cover Crop in an Annual Rotation. Department of Agricultural and Resource Economics at University of California, Davis. September.
<https://coststudyfiles.ucdavis.edu/uploads/pub/2022/09/28/2022covercropsbenefits.pdf>

This cost study is a technical document that enables growers to estimate the management costs for implementing winter cover crops in an annual rotation in the Sacramento Valley. A model scenario was developed through in-depth interviews with growers about their current cover crop management. This study is relevant for small and large-scale growers and was designed to stay relevant in the face of more climate extremes. I chose this publication for various reasons: 1) it is the first cost study I led, which demonstrates my increasing technical ability and skill as an Advisor; 2) this publication documents the economics of a soil conservation practice, which is often overlooked, though it is very important to clientele and critical for adoption; 3) the impetus for this publication came from conversations with clientele about the barriers to cover cropping. This work took an idea derived from a needs assessment all the way to the production of a practical, vetted, and trusted tool.

2. Santiago, S; Light, SE; Clark, NE; Wang, Z; Mathesius, K & Geisseler (2022). Seasonal Net Nitrogen Mineralization in the Topsoil of Subsurface Drip Irrigated Fields. *Communications in Soil Science and Plant Analysis*. August. <https://doi.org/10.1080/00103624.2022.2118305> (also attached).

This peer-reviewed publication quantifies the amount of existing residual nitrogen in organic matter in the soil that becomes available for crop uptake in the growing season. There is an urgent need for improved nitrogen management to increase profitability of field crops, for environmental protection, and to meet state regulations. However, nitrogen management is very complex and providing practical tools growers can use to make management decisions is difficult. This project was a collaboration with CE Specialist Daniel Geisseler, members of his lab, and other CE Advisors. Though this peer-reviewed publication is not written for clientele, the research project continues and ultimately, we will extend this knowledge to growers. I choose the publication because it demonstrates the value of collaborative extension work toward helping growers make decisions to improve on-farm efficiencies and profitability and the opportunity to take complex soil processes into something that is relevant to growers.

3. Light, SE; Williams, S (2022). Cover Crops and Winter Weed Management: Considerations for Annual Rotations in Wet and Dry Years. *Sacramento Valley Field Crops Newsletter*. July.
https://cesutter.ucanr.edu/newsletters/Agronomy_Notes94090.pdf (starts on page 13).

This newsletter article brings together weed pressure data collected from several cover crop research projects to address weed management, a top priority for clientele. I selected this article because it demonstrates my ability to integrate weed management, soil health, and agronomy. In my cover crop trials throughout the region I collected weed pressure data and then looked at opportunities to make recommendations to clientele based on that work. Since we have a lack of weed scientists in our Agronomy team now, I try to incorporate weed management into my program as much as I can to meet clientele need. In addition, this article was published in my Sacramento Valley Field Crops Newsletter. In the past year I began soliciting submissions from other academics throughout the state in order to share relevant knowledge and information with growers in my region. I chose this publication because it demonstrates the upward trajectory of my extension program and ability to collaborate with colleagues. It also shows my ability to integrate different disciplines to produce relevant content.