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Abstract. Extension plays an essential role in serving local communities. How it can support farmers during the pandemic is a novel phenomenon that necessitates careful analysis. Drawing from a survey responded by 313 farmers across Hawai'i in late April 2020, this study assesses how farmers feel Extension can support them best during the pandemic. Farmers identified five areas of needs: community engagement and networking, information sharing and education, funding, research, and local sustainability. Discussion regarding the role of Extension support during the pandemic is offered.

“I hope the extension can think creatively and simply try new ideas, even if they fail. We have to do something; we have to see creative progress. Farmers are working too hard and don't have time to reimagine the system or make concrete steps.”

~A farmer in Hawai'i

INTRODUCTION

Cooperative Extension (Extension) in land-grant universities has played an important role in providing education, research, and outreach across the United States and continues to grow and improve today (Comer et al., 2006). However, more work still needs to be done to build farmers' trust and perception toward extension, and to further improve the awareness and accessibility of these services. Accomplishing this could help farmers better adapt to the changes and uncertainty of the COVID-19 pandemic and other emergent challenges (e.g., climate change). Extension has often played a significant role in crises like these by supporting communities via 4-H and adult education programs as well as disaster preparedness, prevention, response, and recovery training (Koundinya et al., 2020).

During the COVID-19 pandemic, farmers are experiencing a loss of normalcy and connection as a result of social distancing (Mason et. al, 2020). In Hawai'i, the COVID-19 pandemic is significantly affecting those operating small, family-owned agricultural businesses and as a result, many are facing mental health and anxiety challenges amidst the isolation from stay-at-home orders (Cheang

et al., 2020). In times of critical need, Extension provides education, identifies tangible, evidence-based strategies and solutions, and creates places of community engagement to discuss pertinent issues and share information (Alexander et al., 2020). It is vital that Extension stays updated, relevant, and adaptable in their programming during crises. The purpose of this study is to assess how farmers feel Extension can support them best during the pandemic in Hawai'i so that the findings in this study could provide an opportunity for extension professionals across the country to identify creative and enhanced ways to assist farmers overall.

METHODOLOGY

Conducted in late April 2020, this online survey was developed by a group of extension agents at the University of Hawai'i at Mānoa's College of Tropical Agriculture and Human Resources (CTAHR) to collect information on the needs, challenges and opportunities facing farmers during the COVID-19 pandemic. The development of the survey questions was first completed by the study's team (which consists of 14 members) and then the questions were sent to individuals and industry members to obtain their feedback. The final survey consisted of 11 questions including both open-ended and multiple choice. It was sent out through the 14 team members' channels and was also disseminated to the Hawai'i Department of Agriculture, Farm Bureau, and other commercial groups and growers.

This study is part of a larger needs assessment in which only one relevant open-ended question was used for this analysis, “How do you feel CTAHR Extension can support you best during the pandemic?” Among all the 393 respondents, 313 of them responded to this open-ended question, and we analyzed these 313 responses. Two of the authors in this study followed the methodology outlined by Taylor-Powell & Renner (2003): They (1) read and reviewed the data, (2) focused the analysis based on the guiding question, (3) identified themes and patterns of the data, (4) identified connections within and between themes and patterns of the data, and (5) finally took a step back and brought it all together. The two authors then cross-referenced the themes and patterns that they individually identified. This process was used to ensure inter-rater reliability of the data analysis.

RESULTS

The purpose of this study is to assess how farmers feel CTAHR’s Extension can best support farmers during the pandemic. The data reveals that farmers recognize both weakness in CTAHR’s Extension services as well as what CTAHR’s Extension needs to do to support farmers during the pandemic. Combining these two factors, our thematic analysis reveals five areas of needs where CTAHR’s Extension can best support farmers during the pandemic: (1) community engagement and networking, (2) information sharing and education, (3) funding, (4) research, and (5) local sustainability.

COMMUNITY ENGAGEMENT AND NETWORKING

Table 1 provides relevant quotes reflecting this theme. With social distancing and quarantine orders, networking among key players within the food industry was a high priority. Many of the respondents clarified that CTAHR needed to

play a larger support role in bridging the gap between the separate industries within agriculture such as creating a virtual *pa’u hana* (a Hawai’ian phrase literally meaning, “finished work,” referring to relaxing, after work social gatherings). With rapid news development related to the pandemic, participants suggested such events could provide a space for cross-sector networking as well as a platform to provide education, solicit questions, discuss topics, grow awareness, and share agricultural news updates. Networking could also open opportunities for volunteering, exchanging information and resources on how to obtain more funding and grants, facilitate discussions that influence agriculture and policy, and encourage collective marketing to help the farmers to get through challenging times.

Some respondents expressed how rural areas of Hawai’i and Hawai’i County were not receiving services during the pandemic with all the safety requirements in place. Meanwhile, extension specialists and agents have found difficulty in providing the right information and assuring that the services they offer are not redundant with other services provided to help farmers during the pandemic. Establishing strong community engagement and networking could create reassurance and support where people of all industries and backgrounds within food systems can participate, connect, collaborate on projects, and share their expertise, experiences, research, and resources to help alleviate the pandemic related stress and uncertainties. Such a community could build trust, reciprocity, and collaborations, especially for current and new farmers. It could lead to an increased abundance and awareness of resources and reliable information, fostering community resilience during the pandemic.

Despite distancing and quarantine orders, many participants argued that connections to others within the food systems are important and suggested that it is not impossible with all the convenient technologies available.

Table 1. Community Engagement and Networking Theme and Respondents’ Quotes

Themes	Quotes
	Networking to connect agriculture producers to institutions. Virtual pa’u hana! Networking will help us bounce back. Connecting with others for brainstorming. Collective marketing. Reach out to consumers as well. Agents are producer centric.
Community Engagement & Networking	Marketing information, funding for impacted farmers— a virtual pa’u hana is a great idea! Spread the word on how farmers can help each other. Greater networking between agencies would facilitate distribution of crops/meat products during emergencies such as these. Need to work with landowners/managers to develop farm to table (public, visitor industry, homes) programs that are specific to properties and that coordinate with the same programs on other properties.

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Although technological access is a privilege that might not be easily accessible for everyone, digital networking and collaborations allowed many to find help or support. A participant wrote, "All these YouTube and Zoom sessions of political entities talking about food security, let's be proactive and get the islands prepared for possible future supply chain issues . . . let's actively get the community involved and create a think tank for food production. Let's use new technology to support this agriculture effort."

INFORMATION SHARING AND EDUCATION

Table 2 provides relevant quotes reflecting this theme. With new ways of marketing and selling imposed during the pandemic, most respondents expressed a need for more information regarding transitioning their businesses online, increasing the accessibility of shareable information, promoting education and awareness about topics relevant to agriculture, and creating more opportunities for learning and training. They suggested CTAHR's Extension implement webinar classes and education workshops, promote agricultural and agribusiness awareness and consumer education, and translate research documents and materials in other languages. Some participants also mentioned that CTAHR's materials and resources need to be updated with a more current list of extension agents' contact information and that the website itself be further optimized, organized, and simplified to navigate. This would alleviate the farmers' confusion and concerns. As one said, "Don't know how to say this very well, but I do not understand enough about the whole business from growing, to marketing, to our part of

the economy, to know who has to move first to get the ball going once more."

Participants also suggested that CTAHR's Extension create a farmer support service to share information during disasters, a telemedicine hotline and virtual therapy to address farmer stress and mental health needs, recovery support after disasters, and/or technology assistance are all mentioned as examples. Many participants identified that CTAHR's existing online resources are not accessible to everyone in the community.

FUNDING

Table 3 provides relevant quotes reflecting this theme. With many state and federal grants available to support farmers during the pandemic, many participants mentioned that CTAHR's Extension help in identifying funding and grant writing, so their businesses can stay in operation. Some farmers emphasized specific areas of grant support such as paying infrastructure related expenses. "Help us obtain available grants to set up infrastructure. . . More chill boxes, freezer space, building repairs, etc.," they noted.

While some farmers were able to pay bills despite decreased income during the pandemic, others expressed concern for small business farmers in terms of access to funding and eligibility. A farm manager who runs a small farm further emphasized the need for funding support for small farm owners and said "I am currently furloughed from my salary farm management position in a company effort to keep laborers out in the fields. I am working for FREE to ensure our farm and its production has guidance and direction!"

Table 2. Information Sharing and Education Theme and Respondents' Quotes

Themes	Quotes
Information Sharing and Education	Keep things simple. Some agriculture publications sound like they are for chemistry majors.
	Help with translations of documents to our immigrant farmers.
	CTAHR can help educate ourselves and our customers on how to work in this new pandemic environment. This way, we can work safely.
	Easy one-page linking to funding resources, guidance on virus safe food chain, and keep reminding us of the plethora of info. you guys have online.
	Centralize and catalog information. Currently too much information, much of it is redundant and distributed from too many resources.
	Info. on marketing online, possible funding sources, being a hub of information for farmers to share with each other.
	Can a list of all the agents, contacts, and specialties be sent out so we know who to contact according to what problem we have?
Implement tracking system for responsiveness and quality of guidance dispensed by extension agents. Too many calls, e-mails, etc.. go unanswered.	

Table 3. Funding Theme and Respondents' Quotes

Themes	Quotes
Funding	<p>Too many hoops and lack of information in obtaining aid for our farmers.</p> <p>Would be great if the state and county found funds to help with health insurance/make it affordable for farmers.</p> <p>Help rally more funding from the HDOA.</p> <p>Advocate for grants, not loans.</p> <p>We have a website, but do not have funds to promote it.</p> <p>We need a produce co-op where we can bring our harvest and be paid. We spend too much time contacting people to see if we can sell to them. CSA boxes take too much time, and we need to spend time working.</p> <p>I have been trying to obtain partial funding for a collaborative robot, but equipment purchase for testing and orchard demonstration is disallowed from many funding venues.</p>

Table 4. Research Theme and Respondents' Quotes

Themes	Quotes
Research	<p>We have so many periodicals from CTAHR that are very dated.</p> <p>Get less political and more scientific in understanding the whole basis of today's problems.</p> <p>More studies in plant viruses and soil diseases.</p> <p>Find out what farmers need from the state to continue doing business, so the services they require won't get cancelled because of budget issues.</p> <p>We need research on taro disease control/prevention and cultivation in above ground planters.</p> <p>CTAHR tends to focus on long range pie in the sky research instead of working on the small simple issues that would add value to the growers.</p> <p>Collect data on how CTAHR can repurpose and refocus itself. Be open to making infra-structure changes in your own organization.</p> <p>This was a great survey. I'd love to see these surveys put in front of more consumers too. Maybe both sides would be able to extract new and important information for the progression of food, land, water, and people's rights/ sovereignty.</p>

Table 5. Local Sustainability Theme and Respondents' Quotes

Themes	Quotes
Local Sustainability	<p>The ramifications of this outbreak in the long term are unclear given the general fragility of our economy in Hawai'i.</p> <p>Work with policy makers, government, institutions to promote local food consumption.</p> <p>CTAHR needs to contribute to making sustainable agriculture a vital part of Hawai'i 2.0.</p> <p>CTAHR should do its utmost to support backyard farmers and homesteaders and small farmers to help Hawai'i become food sufficient.</p> <p>There need to be more hands-on opportunities for people to learn how to grow food on their own.</p> <p>Most people think farmers grow food and do not think that they are farmers. You should try to shift the thinking, so we all realize that PEOPLE grow food (and need to).</p> <p>Marketing locally produced agricultural products needs to be a key element for CTAHR as well as the state Dept. of Ag.</p>

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Even if there were small funding opportunities provided by the Hawai'i Department of Agriculture (HDOA), farmers noted that a large amount of work is needed to obtain meager funding and commented, "there are no financial programs for extra small farmers! HDOA's \$2,000 grant emergency relief program is a JOKE and an INSULT! New HDOA program paperwork is too much to do." There was also a concern in paying back the loans/funds. One participant wrote, "we took a substantial hit initially when all the restaurants cancelled their orders with us overnight. While loans might be helpful for some farmers, what is honestly most needed right now is grants or disaster relief funding that does not need to be paid back."

As a result, participants desired support from CTAHR's Extension to assist with grant-writing and advocate for streamlined applications, especially for small farms. One farmer highlighted the importance of having an extension agent's assistance in preparing and submitting funding applications, finding funding options, and helping with marketing products and business acumen. The farmer needed help with "funding sources, marketing products, and assistance in understanding what is asked in filling out forms and articulating answers to fit the questions asked."

RESEARCH

Table 4 provides relevant quotes reflecting this theme. Participants mentioned that CTAHR's Extension could best support farmers if its research stations continued to operate during the pandemic, as this provided a sense of security to the farmers who rely on new research updates during the pandemic. Participants expressed their concerns regarding CTAHR's services that have been temporarily halted due to the pandemic and noted that "we have stopped all new research and are on hold for many CTAHR programs. Not sure how they can help at this time."

Participants suggested that CTAHR (1) improve integration between extension and research, (2) conduct a literature search to update research materials and technical documents with current global research on agriculture and (3) make research articles electronically available. Research pertaining to the pandemic's challenges on agriculture and food systems can offer more tangible, evidence-based solutions and reassurance to combat unreliable information that currently exists. One farmer discussed the proper use and storage of personal protective equipment (PPE) and said, "lots of farmer mis-information out there, like N95 masks can last 40 hours of use, you can take them on/off at will, sunlight does not affect their electrostatic filtering abilities when you hang them on your truck visor."

Research activities have the potential to provide information (to the public) and explain CTAHR's Extension initiatives. They also provide extension agents with data that represent a community's needs, assess current program

efficiencies, and offer new solutions to improve the overall capacity of extension services. One participant said, "this was a great survey. I'd love to see these surveys put in front of more consumers too. Maybe both sides would be able to extract new and important information for the progression of food, land, water, and people's rights/sovereignty."

LOCAL SUSTAINABILITY

Table 5 provides relevant quotes reflecting this theme. Participants expressed concerns regarding the future uncertainties of local food sustainability and the state's economic well-being and noted, "the stress is heavily related to uncertainty and the unknowns of how to survive as an industry or business." Even for those whose businesses were not severely impacted by the COVID-19 pandemic, there were still concerns regarding potential long-term impacts on the state's economy. Given these uncertainties, participants suggested that CTAHR promote more education on how to eat and source local foods, educate the community on the benefits and importance of eating local, support policies that incentivize local food purchases, work with state and federal lawmakers to advertise and market local products, and contribute to a short-term and long-term sustainability plan for Hawai'i agriculture. Participants also commented that CTAHR needed to develop more material and programming that focuses on the values of personalized, meaningful connections and relationships between local people and food such as where food comes from, how food brings families and peoples together, and how it affects both individual and community health.

In order to strengthen and increase local food consumption, participants suggested CTAHR prioritize local sustainability, reevaluate its organization's purpose, and make any necessary infrastructural changes. Participants further commented that CTAHR needed to collaborate with state lawmakers and leaders to reassess programming strengths and weaknesses and promote, educate, and empower people through local sustainability programs and initiatives which would ultimately open Hawai'i to greater economic abundance and resilience.

Despite these uncertainties, participants expressed their hopes and confidence for local food and economic sustainability and noted, "This is Hawai'i's golden opportunity to make big changes to our economy. Tourism has a place in the mix, but it needs to be limited in scope compared to the past, and agriculture with the goal of food self-sufficiency for the state needs to be our number one focus and investment of time and money."

DISCUSSION AND CONCLUSION

While the themes of community engagement and networking, information sharing and education, funding, research and

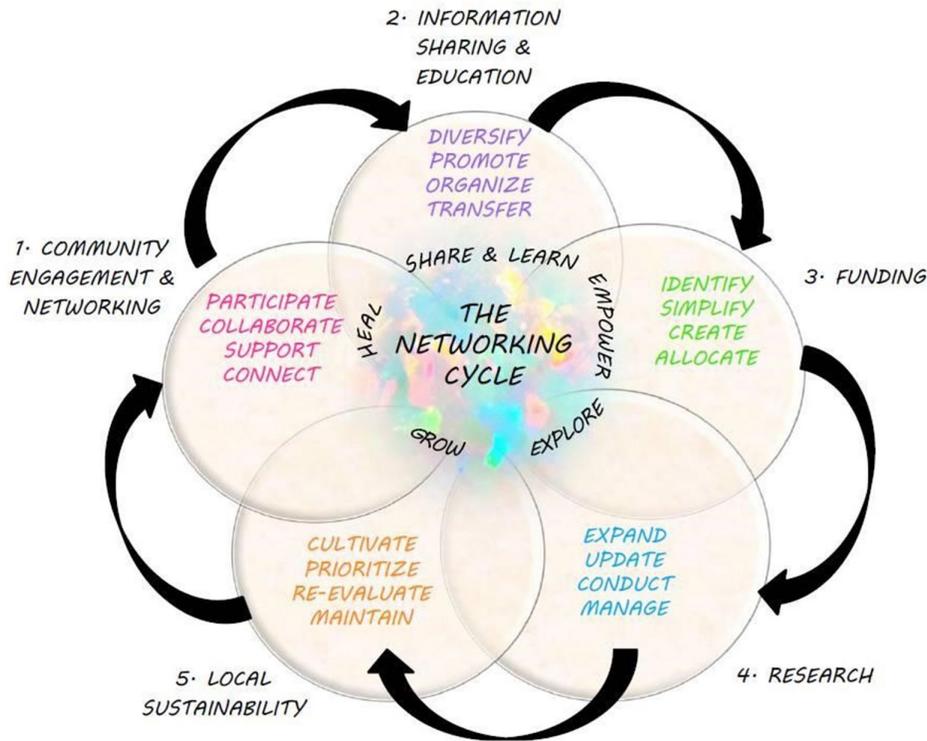


Figure 1. The networking cycle.

local sustainability shared different levels of importance and dominance, our analysis showed that community engagement and networking played a key role across each of these themes. Figure 1 illustrates the networking cycle of farmers’ need for support from CTAHR’s Extension during the pandemic. Through a community survey, people from various fields of agriculture expressed their need to connect and to have a safe space to learn and share information to create a supportive learning environment. This allows the community to learn about various topics such as online marketing, growing and maintaining a business, writing grants, and locating funding resources to help get them through the pandemic.

Subsequently, if Extension is effective in obtaining funding, it can have the potential to further develop agricultural research within the community and at educational institutions such as CTAHR and the University. Research findings can facilitate Extension-community collaborations to assess needs that help in the sustenance, maintenance, and sustainability of Extension programming. This can eventually help with the formation of both short-term and long-term strategic plans.

Despite the challenges, losses, separations, lack of connection, and uncertainties experienced by many, the ability to connect, relate, and remind each other of their shared connection is the greatest strength of the farmers. The following participants’ comments introduced little glimpses of reassurance, gratefulness, light, hope, and re-connection:

- “I am thankful that we are learning. Sad part is that it had to take a pandemic to move us out of our comfort zone.”
- “Networking will help us bounce back.”
- “We are all in this together and I hope that carries on after the virus is tamed.”

RECOMMENDATIONS FOR CREATING & FOSTERING BETTER NETWORKING ARENAS

Everyone has a part to play in the food system networking cycle and there is a need for more connection between players within food systems. In our study, most participants mentioned the need for more reliable delivery methods of information pertaining to new research, funding, agribusiness, and transitioning to online marketing and networking. A similar assessment of grower communication networks and information sources in North Carolina counties found that most of their respondents mentioned networking (peer-to-peer interactions) and personal relationships to be the most effective delivery method and source of information transfer (Crawford, 2015). However, networking as a solution for strengthening connections, especially during the COVID-19 pandemic, is still unmentioned, under-researched, and lacking in tangible suggestions. The two sections below highlight both short-term and long-term recommendations for improving networking arenas throughout different stages of the COVID-19 pandemic.

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SHORT-TERM: ACCEPT. REFLECT. ADAPT.

Short-term networking strategies include:

- Use this time to reflect and assess network strengths and weaknesses via surveys and community feedback, then plan accordingly to improve services offered.
- Set up an online video meeting to create or gather a network of people from the community together that can minimize stressful feelings, as well as to discuss relevant issues such as identifying funding, transitioning a business online, and mental health resources.
- Focus on starting and maintaining small networks and fostering trust and reciprocity, gradually growing them overtime.
- Prioritize the quality of developing personal relationships. Encourage participation through team-building activities, check-ins at the beginning of meetings, and ensuring that everyone's contributions are appreciated and recognized. This will equally increase the retention of current participants and be welcoming and less intimidating to new participants.

LONG-TERM: SUPPORT LOCAL. ADVOCATE. MAINTAIN. LONG TERM NETWORKING STRATEGIES INCLUDE:

- Take some time to learn more about farmers, their challenges, needs, and the importance of their work and contributions during this pandemic.
- Advocate for farmers by reducing barriers to accessibility such as creating funding, volunteering, starting a grant applications service to stream-line grant applications, discussing with lawmakers and within networks to prioritize services and creating educational extension programs to help both current and future farmers.
- Update the relevance of the research, making articles electronically available and language accessible, and diversifying research topics.
- It is also important to note that these services to farmers not only need to be updated, but also consistently maintained.
- Collaborate with networks to create and conduct surveys, needs assessments, research studies and publications that contribute new information to the field for those within the network, and others, to reference, share, learn, and use as inspiration to take actions of their own.

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