

## **From Resistance to Receptiveness: Farmer Willingness to Participate in Extension Discussions About Climate Variability and Climate Change**

**David C. Diehl**  
**Elder P. Garcia**  
**Nicole L. Sloan**  
*University of Florida*

**Daniel R. Dourte**  
*The Balmoral Group*

**Sebastian Galindo-Gonzalez**  
**Clyde W. Fraisse**  
*University of Florida*

*Identifying what Extension professionals believe are the critical elements of a communication strategy that is most likely to encourage agricultural producers to participate in discussions of climate variability and climate change is pivotal to providing timely solutions to issues facing farmers. The current study involved interviews with 50 Extension professionals from four southeastern states (Alabama, Florida, Georgia, and South Carolina) who were engaged in ongoing work related to climate and agriculture. Respondents were asked to assess how best to engage farmers in conversations related to climate variability and climate change. Qualitative analysis showed that Extension professionals recommended avoiding content related to politics, attribution of climate change to human causes, and telling farmers what to do. Respondents recommended emphasizing adaptation strategies, climate variability over climate change, evidence that climate change exists, and the financial benefits for farmers. In addition, Extension professionals proposed several delivery methods they thought would be most effective with farmers, including delivery tailored to the characteristics of the audience, a positive overall tone, and an understanding that engagement should be viewed as a long-term process based on building relationships with farmers. The findings suggest that farmers are a potentially receptive audience on climate issues when properly approached.*

**Keywords:** communication, producers, farming, adaptation, Southeast, climate variability, climate change

## Introduction

Climate variability and climate change pose substantial risks to agricultural production. Rising temperatures, changing precipitation patterns, and more frequent extreme weather events significantly alter the distribution of crop yields, the reliance on dryland and irrigated production systems, and the geographic range and severity of pest outbreaks (Malcolm et al., 2012). Increasing variability in climate conditions intensifies both the management and economic risks facing farmers, who must then adapt to address climate risks such as flooding, drought, pest and disease pressures, and heat stress (Arbuckle, Hobbs, Morton, Prokopy, & Tyndall, 2014). Although agricultural producers have developed strategies for responding to local weather variability, Extension and outreach strategies are needed to build a deeper understanding of what motivates farmers to take action (Bartels et al., 2013; Malcolm et al., 2012).

Climate change science is inherently complex and rather challenging to convey to a variety of public audiences. In the broader context of climate science communication, Moser (2010) has summarized a variety of factors that contribute to this challenge, including:

Invisibility of causes, distant impacts, lack of immediacy and direct experience of the impacts, lack of gratification for taking mitigative actions, disbelief in humans' global influence, complexity and uncertainty, inadequate signals indicating the need for change, perceptual limits, and self-interests. (p. 31)

As it relates to agricultural producers, communicating climate science is especially challenging because agricultural Extension professionals tend to be more skeptical that climate change is occurring or is influenced by human activities. Wojcik and her colleagues (2014) found that agricultural Extension agents are more likely than other Extension agents to be “dismissive” of climate change (i.e., convinced that climate change is not happening) and “doubtful” of climate change (i.e., unsure that climate change is happening). This skepticism makes agricultural Extension agents less likely to engage in outreach activities related to climate and agriculture, and less likely to engage farmers in meaningful discussions of how they can react to climate variability and climate change: “If it [climate change] is not happening, there is no need to do something” (Prokopy, Morton, Arbuckle, Mase, & Wilke, 2015, p. 187).

In response to the challenges of communicating climate science to agricultural audiences, researchers and outreach professionals are modifying previously used Extension outreach approaches and developing new models to engage Extension agents and farmers in discussions about climate. Prokopy et al. (2015) identified two factors that can increase willingness to learn about, understand, and adapt to climate both globally and locally: “1) reduce the threat to individual worldviews of believing in climate change and 2) increase opportunities for dialogue among scientists, intermediaries, farmers, and the voluntary organizations to which farmers belong” (p. 187). Several researchers have noted the success of using outreach approaches that

form relationships between researchers, Extension professionals, and farmers of differing beliefs, knowledge, and skills (Arbuckle et al., 2014; Leeuwis, 2013; Morton & Brown, 2010). These evolving delivery methods focus on nurturing a respectful relationship with clientele through carefully building trust and delivering trainings in accessible language and in a positive tone.

The current study was carried out in the context of a larger project which was designed to advance the use of climate information for agricultural management in the southeastern United States. The project, Southeast Climate Extension, emphasizes engagement with farmers as the foundation for education and outreach and cultivates conversations with farmers about the ways in which climate variability and change affect agricultural production and how farmers can increase their resiliency in the face of these changes. The primary research question for the present study was, “What do Extension professionals believe are the critical elements of a communication strategy that is most likely to engage agricultural producers in discussions of climate variability and climate change?”

## Methods

Fifty Extension professionals engaged in ongoing work related to climate and agriculture were interviewed to determine their perceptions and opinions on topics related to climate variability and climate change. The interview sample was drawn from existing networks and contacts within four southeastern states (Alabama, Florida, Georgia, and South Carolina), and snowball sampling was used to identify additional contacts. Interviewees included individuals who identified themselves as county Extension agents, state Extension faculty, researchers, and administrators. Sample characteristics are presented in Table 1.

**Table 1. Sample Characteristics**

Characteristic	N	%	Characteristic	N	%
<i>Gender</i>			<i>State</i>		
Male	39	78	Alabama	11	22
Female	11	22	Florida	18	36
<i>Ethnicity</i>			Georgia	11	22
Caucasian	40	80	South Carolina	10	20
African-American	5	10	<i>Provide Climate Information</i>		
Hispanic	5	10	Yes	28	56
<i>Education</i>			No	22	44
Bachelor's Degree	2	4	<i>Target Audience for Climate Information</i>		
Master's Degree	17	34	Farmers	25	50
Doctoral Degree	31	62	Ranchers	8	16
<i>Extension Role</i>			Other Extension Faculty	17	34
County Faculty/Extension Agent	13	26	<i>M</i>		
State Extension Faculty	17	34	<i>Min</i>		
Researcher	10	20	<i>Max</i>		
Administrator/Director	10	20	<i>Age (years)</i>	49	29
			<i>Extension Experience (years)</i>	15	1
					37

The interviews were semistructured, and the specific question being analyzed for this study was, *If we want to engage producers in conversation about climate and agriculture, how do you think we should go about approaching them on the issue of climate variability and change?*

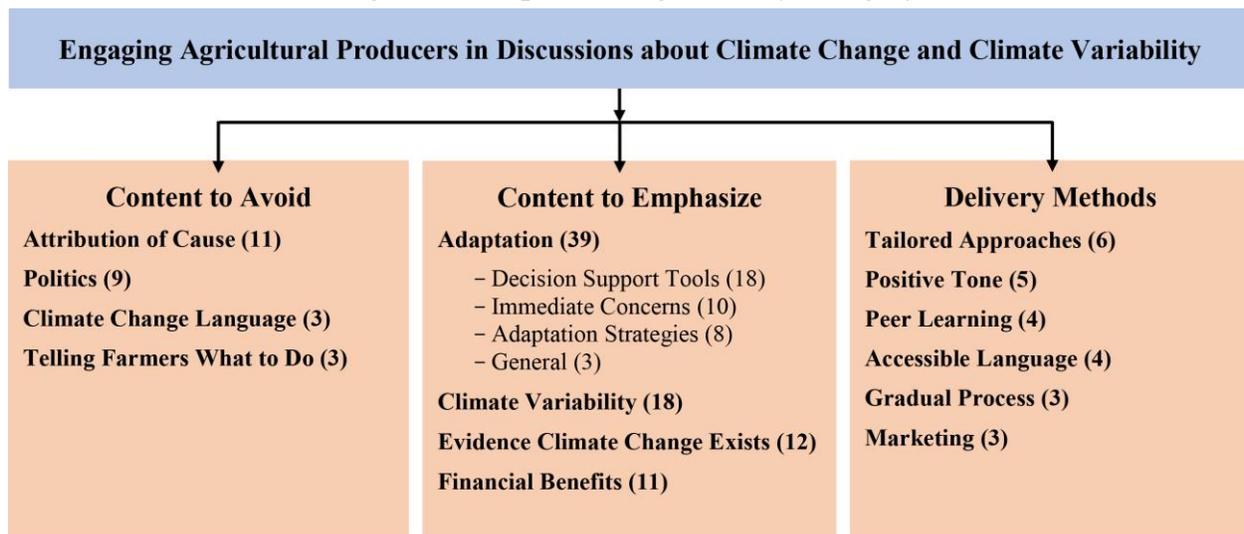
Interviews were carried out via phone and were recorded and transcribed for analysis.

Qualitative analysis was conducted using an inductive framework (Thomas, 2006) in which major codes were generated based on an initial reading of the text. A team of two researchers generated initial codes and definitions and also identified possible tensions and sources of disagreement. All codes were finalized using a consensus process of a three-person research team (the original two coders plus one additional researcher). The original codes were further organized into larger categories as presented in the Results section.

## Results

Three major categories of responses emerged from the data: *content to avoid*, *content to emphasize*, and *delivery methods*, with corresponding codes falling under each category. These categories and codes (including number of mentions for each) are presented in Figure 1 and are discussed in greater detail below.

**Figure 1. Responses Organized by Category**



*Note:* Visual overview of concepts mentioned (with number of mentions in parentheses) in response to how to engage agricultural producers in discussions about climate variability and climate change.

### Content to Avoid

There were 26 total mentions of content areas to avoid when discussing climate issues with farmers: *attribution of cause*, *politics*, *language of climate change*, and *telling farmers what to do*.

**Attribution of cause.** Eleven individuals suggested that when discussing climate change with farmers, Extension professionals should avoid attributing climate change to humans. One professional said, “We should avoid stressing anthropogenic climate change explicitly,” and another suggested, “We just need to let them know that this is something that has been going on, and it’s not necessarily because of humans.” The primary reason for avoiding discussions of human-caused climate change is that it gives rise to controversy and disagreement, which leads farmers to be less enthusiastic about becoming engaged in discussions related to climate variability and climate change.

**Politics.** Nine Extension professionals mentioned that discussions of climate should be separated from politics and instead be focused on the relevant science and practical implications for farmers. For example, one researcher said, “I think we just need to get the politics out of it, and I think once we do that, people won’t think you’re there to try and force something on them as kind of a social program or something.” A state Extension specialist added:

I think most farmers are conservative in their political stance, and I think that whoever is doing it [training] needs to be careful to make sure that it’s clearly based in science and cognizant of the fact that growers may be uneasy with a perception that a political agenda or view is being put forth.

**Climate change language.** Three individuals suggested that the terms *climate* and *climate change* carry negative connotations for many farmers and should be avoided. One state Extension specialist said, “We have to be very cautious of using the *climate change* term because people might...walk away and what you want to do is to capture their attention.” Another state Extension specialist added, “People tend to put a wall up when they hear the word *climate* because it has been politicized so much. Once emotion comes into play, no amount of science is going to change someone’s mind.” He also suggested to “find a way of not using the word *climate*, and just talk about weather patterns and patterns of drought and what we’re seeing and what we’re forecasting by learning from the past.” It is interesting to note that, in contrast, one individual (not counted in these three) commented that the term *global warming* should be avoided in favor of *climate change* and *climate variability*.

**Telling farmers what to do.** Three Extension professionals expressed that farmers become less engaged when the conversation focuses on regulations or telling farmers to change their practices. For example, a researcher mentioned that:

Farmers feel like they’re going to be regulated, and they feel like their opportunities are going to be taken away from them...and I think regulation is something that people are not so interested in talking about.

One county faculty said:

They don't want you coming in and telling them, "This is what you should be doing to avoid that from happening." I was telling someone that there are still a lot of people who are of the belief that "I own my property; I don't want you telling me what to do with it."

### **Content to Emphasize**

Eighty mentions received codes that were organized under *content to emphasize* during climate communications and workshops: *adaptation* (i.e., *decision support tools*, *address immediate concerns*, and *provide adaptation strategies*), *climate variability*, *scientific evidence that climate change exists*, and the possible *financial benefits* farmers would realize as a result of increasing their adaptive capacity.

**Adaptation.** Thirty-nine respondents focused on climate adaptation and the immediate ways in which farmers could benefit by adapting their farming practices to possible increases in climate variability and extremes. In essence, these individuals suggested that farmers will pay attention to climate information when it has immediate and practical use to inform their practices and increase their resilience.

***Decision support tools (18 mentions).*** The first code under adaptation was decision support tools which refers to the information and tools that can be used to guide farm management decisions. One researcher said:

We always should keep in mind that we need to put information together for farmers that track weather conditions, monitor weather now, and talk about the forecasting for the season in a single package...That is based on my experience with the beginning of this whole story, in terms of AgroClimate and seasonal climate variability. The tools that have more success in our system are the ones like disease forecasting which is very much driven by weather and short-term forecasts the next three days. So because of that success, I can approach those producers now and talk about seasonal forecasting because they know that we can do something for them, and they think this information is useful.

Within the category of decision support tools, there were several specific references to the importance of weather forecasting and seasonal forecasting. One state Extension professional stated, "In the climate office, they put out maps and stuff of the next thirty days of what they think it is going to happen. And I think that helps farmers kind of plan a little bit on when to plant, when to do field operations and stuff like that." An administrator also said that farmers are interested in the "temperature and rainfall for the year, by the month...they love all that kind of stuff, they love looking at that kind of data."

**Immediate concerns (10 mentions).** In a related code, respondents focused on the broader idea that presentations should address issues and concerns of immediate interest to farmers, including a strong emphasis on drought and issues related to water access. A researcher said discussions:

Should be linked to concerns that the farmers currently have, or have for the future, that motivate them, like groundwater depletions...everybody is concerned about water, so I think water is the key element to focus on.

Another researcher said that climate change is:

Still kind of far off, and my immediate concern right now is how to run my farm tomorrow. And that's a whole group of people that say, "Yeah, climate change is important," but they don't see the immediacy of learning about it.

**Adaptation strategies (8 mentions).** Respondents also suggested that farmers will be more engaged when presentations focus on specific adaptation strategies or technologies that farmers can use to become more resilient and adaptive in the face of climate variability. A state Extension professional said:

You should be focusing on best management practices. So let's call it adaptive farming, how are you going to adapt your practices, or give them the ability to respond to whatever climate comes in...so you provide them with some way of responding to whatever climate is present at the time.

A county Extension professional said that you "can present different techniques for decreasing your vulnerability to drought by increasing your water storage capacity in your soil through no-till, through methods that incorporate more organics into the soil, whether they be green manures, cover crops, et cetera."

**General (3 mentions).** Other respondents mentioned the concept of adaptation, but in very general terms. For example, a state Extension professional said, "The emphasis should be more on just being adaptable and resilient in the face of climate variability because that will help with shorter and long-term." An administrator also said, "I think that we've got to approach it from the perspective of, 'if in fact there is climate change, how can you as a producer be in a better position to adapt to it?'"

**Climate variability.** In specific contrast to the idea of *climate change*, eighteen respondents suggested that farmers would be more receptive to the idea of *climate variability*, in part because they are personally familiar with the idea that weather conditions can vary widely from year to year and that these variations may be increasing. For example, a researcher suggested that:

Climate variability is something that producers connect to. Starting with [discussions of] variability before you go to change can be effective...They might not say climate variability, but they know what climate variability is...just changes in rainfall or a dry year or a wet year, or whatever.

An administrator also said, “Climate variability to a producer is much more important than climate change. Climate change is long-term. If you can give a producer heads up 12 months in advance that we’re entering a drought period or rainy period that would be very, very useful to them.” A state Extension professional specifically tied seasonal climate variability to the El Niño Southern Oscillation (ENSO), a leading driver of year-to-year and seasonal climate variability, saying:

We will be successful if we link the climate variability with production...If we can say, for example during La Niña phase, wheat yields are going to be higher, looking at historic records of yields, Niña years have been higher than Niño years. It’s very important to make that linkage.

**Evidence climate change exists.** Twelve respondents suggested that farmers need to be provided with evidence that climate change exists. For example, a state Extension professional said, “I think that for some people you are going to have to convince them that climate change is happening, and it is not a short-term deal.” A researcher also emphasized the historic nature of climate change, saying that we need to “let them know that climate is changing, it has always changed. This is nothing new under the sun, and this has always been going on.” A state Extension professional said, “I think we can and should use the language of climate change and maybe provide evidence about climate change that will provide more ammunition to help them understand what’s really happening.” Finally, an administrator said:

What we do in Extension, what we’ve always done, what we’re known for is...factual, unbiased data, and we’ve got to keep that in mind when we start to talk about climate change, we’ve got to be the same...We’ve got to go in with the numbers and we’ve got to show them why we, as scientists, think this is something that they need to pay attention to.

**Financial benefits.** Eleven respondents discussed the idea that farmers will be most receptive to climate information when it is connected to possible financial benefits for farmers. An administrator said, “If it affects their bottom line, they’re going to listen. So if we talk about the finances of that, that’s the best, that would be the most successful.” A researcher also said, “If you could tie it to the economy, about how people could save money, that would be clearly a good idea.” An administrator suggested that the most successful approach would be to “give them whatever information is available that they could use that data to make decisions in what

makes them more profitable.” Finally, one respondent, a county faculty member said, “You combine the scarcity of the resource with the overlying or amplified variability with the climate, and you’ve got an attentive client who’s willing to listen to something that has a feasible payback period.”

## Delivery Methods

In addition to climate content, respondents provided insight into the ways in which they believed Extension educators could deliver climate information that would be most likely to engage farmers. There were 25 mentions of *delivery methods*, with the major codes being *tailored approaches*, *positive tone*, *peer learning*, *accessible language*, engagement as a *gradual process*, and *marketing*.

**Tailored approaches.** Six Extension professionals mentioned that climate materials and communications should be specifically tailored to the characteristics of the audience. Tailoring can be based on a variety of factors, including farm history, location, size of operation, and type of crop system. As a county Extension professional suggested, “It’s important to assess who is coming and if people have different needs.” For instance, he emphasized the importance of “understanding their crop production system and not just giving them the theoretical big picture right up front.” A researcher also suggested “having people discuss their long history in farming” as this “gets them thinking about their long-term changes and what’s happened since their parents and grandparents have been there.” Finally, an administrator stated that Extension should not “show a guy from South Carolina data from Alaska and think that they care. People want to know what’s going to happen in their backyard, because that’s what affects what they grow and produce.”

**Positive tone of delivery.** Five respondents suggested that Extension professionals should focus on the positives and be straightforward and nonaggressive when engaging in climate conversations. For example, an administrator said that Extension should “approach the question from a positive point of view—in terms of potential opportunities in their future.” A researcher also mentioned that “We need to make it clear to them that we’re not here to criticize how they live or their lifestyle, but to talk about something that is changing very gradually and that it’s going to happen regardless.” Finally, a county Extension professional added that we need to “be able to talk to these people and engage them in a way that they don’t feel like you’re talking down to them or telling them what to do, or that you’re policing them.”

**Peer learning.** Four Extension professionals suggested that having farmers talk to other farmers about their experiences and successes increases their interest in the topic of climate variability and change. For example, one administrator said that Extension should introduce “peer farmers in their commodity group that can say ‘Yes, we see this as happening, and here’s what we’ve

done, and here's some of the ways we've profited by following these best management practices.'" A county Extension professional also mentioned that we have to "show farmers how other growers have been using this information. So once you lay the foundation in terms of concepts and all that, it stays with them." Finally, a researcher emphasized the importance of early adopters, stating that the "best way is to get the lead farmers to accept the modifications in their farming system, and then everyone else is going to follow as they see how they stay profitable."

**Accessible language.** Four respondents mentioned that Extension professionals should use accessible language when discussing climate information. One county Extension agent said, "Speaking a language which they can relate to can be very, very critical." Another county Extension agent added that because farmers "go out and look at blogs and look at the Internet, they're accessing that information, so it's got to be simple." Finally, an administrator suggested that Extension professionals should present information "in a way that [farmers] can understand."

**Gradual process.** Three Extension professionals suggested that engagement in climate discussions should be a gradual process. A researcher said to "start with something tangible like weather, which is actually what they care about, and then slowly move the discussion into climate variability which is relatable to their everyday lives." A county Extension professional emphasized the need to:

Work from the platform of historic weather patterns with particular emphasis on weather extremes, so you create a common reference or set of facts. You know the presenters are talking about events that long-term producers have lived through and remember. And then if you go from that to looking at projections for change in the frequency of extreme events, then hopefully you have established credibility from starting at a point of common agreement on a set of facts, both historical and experiential for the clientele.

**Marketing.** Three respondents mentioned that Extension professionals should focus on marketing approaches when presenting climate information. For example, a state Extension professional said to "market it [a workshop] as improving your management skills." A county Extension agent also recommended to "advertise having a clinic, workshop, or meeting," adding that "the content of the workshop can focus on climate variability and climate change, but that it shouldn't be in the title." Finally, a state Extension professional said that "marketing has got to be aggressive."

## Discussion

The interviewees in this study were already engaged in climate discussions in Extension, making them uniquely positioned to offer opinions about both content and delivery especially with regard to their less-engaged colleagues. In relation to engaging farmers in climate discussions, Extension professionals suggested avoiding issues related to politics, attribution of climate change to human causes, and telling farmers what to do. The interviews suggest that all of these factors contribute to farmer resistance rather than receptiveness to climate change messages. Overall, interviewees were also cautious about using the explicit language of climate change with farmers. In terms of content to emphasize, Extension professionals specifically recommended focusing on adaptation, climate variability, evidence that climate change exists, and the financial benefits for farmers. A strong focus on tangible solutions to climate challenges, in the form of adaptation strategies, was a central message conveyed in the interviews. More than any other mention in terms of content to emphasize or avoid was to focus on adaptation solutions, meaning particular management strategies that have the potential to reduce the current and projected climate risks. Finally, Extension professionals proposed several delivery methods they thought would be most effective with farmers, including delivery tailored to the characteristics of the audience, a positive overall tone, and an understanding that engagement should be viewed as a long-term process based on building relationships with farmers.

The politically and ideologically contentious nature of climate change research and outreach often evokes strong emotional responses that do not lend themselves to action (Arbuckle et al., 2014; Kahan, Jenkins-Smith, & Braman, 2011; McCright & Dunlap, 2010). Further, agricultural Extension agents are notably resistant to the concept of climate change (Wojcik et al., 2014), making this an especially challenging audience for climate information. This is not to say that current training events are being framed in a political context, but that events must be explicitly separated from politics and that the audience must perceive that the content is nonpolitical and unbiased. In addition, content that focuses on the human causes of climate change is especially problematic for agricultural audiences. As Arbuckle et al. (2014) stated, “Engagement strategies targeting farmers more broadly should not focus overtly on the human role in climate change to avoid alienating the large swath of Corn Belt farmers who do not believe in anthropogenic climate change” (p. 515). Regardless of geographic location, discussions that focus on the causes of climate change rarely contribute to farmer engagement and action. Bartels and colleagues (2013) also suggested that engagement efforts should avoid politics and focus on immediate concerns of farmers.

Currently, many climate outreach models do not focus on the immediate needs of farmers (Prokopy et al., 2015), and our findings are largely consistent with the research of Arbuckle and colleagues (2014), who stated that “the development of extension and outreach strategies that effectively support farmer adaptive action is critically important” (p. 505). Our findings suggest

that Extension systems will better serve farmers by focusing on adaptation strategies that inform management solutions and improve farmer resilience in the face of climate variability and change. When Extension provides information that tangibly addresses farm productivity and profitability, farmers are more likely to engage in discussions that ultimately touch on issues related to climate, such as extreme weather events; seasonal variability; precipitation patterns; drought, pests and diseases; and extreme temperatures (Bartels et al., 2013; Fraisse, Breuer, Zierden, & Ingram, 2009). Possible adaptation topics of interest to farmers due to their immediacy include available decision support tools, seasonal forecasting, sod-based rotation, conservation tillage, irrigation management and technologies, and varieties adapted to specific growing conditions. Previous research has also suggested that integrating climate adaptation strategies into existing Extension programming is an efficient way to reach farmer audiences without creating additional time burdens for farmers or having to convince farmers to attend a climate-specific training event (Diehl et al., 2015). When delivering content intended to appeal to farmer needs, it is also critical to understand the specific growing conditions and challenges of the region and crops being addressed (Arbuckle et al., 2014; Prokopy et al., 2015).

In describing the successes of their “climate learning network” that brought together farmers, Extension specialists, and researchers for a series of meetings, Bartels et al. (2013) suggested that by beginning with tangible topics such as weather and ENSO, farmers became more engaged in the implications of climate and that “enhanced dialog within this learning community among producers and researchers could lead to the collaborative development of management-relevant options for adaptation over the long-term” (p. 8). Building a learning community of scientists and farmers engaged in ongoing discussions of climate and agriculture requires patience and an understanding that farmer engagement is a long-term process of joint learning.

In addition to the emerging body of research on climate change education in Extension, the current study found that Extension professionals are starting to recognize the value of open and honest conversations that are based on mutual trust and respect. As Arbuckle et al. (2014) stated, “engaging farmers in creative adaptation to their more immediate experiences (e.g., increased weather variability) rather than the causes (climate change) will be a more effective route to resilience” (p. 515). By starting with a common understanding of regional weather conditions, based on both experience and historical data, educators can establish relationships that provide solutions to the immediate concerns of farmers (Bartels et al., 2013). Such solutions have tangible financial benefits for farmers, which further reinforce engagement and participation. Ultimately, discussions of climate in agriculture are best framed in terms of adaptation strategies and resilience.

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*David C. Diehl* is an associate professor of program planning and evaluation in the Department of Family, Youth and Community Sciences at the University of Florida.

*Elder P. Garcia* is a data specialist in the Department of Family, Youth and Community Sciences at the University of Florida.

*Nicole L. Sloan* is a research coordinator in the Department of Family, Youth and Community Sciences at the University of Florida.

*Daniel R. Dourte* is an agricultural engineer and hydrologist at The Balmoral Group in Winter Park, Florida.

*Sebastian Galindo-Gonzalez* is a research assistant professor in the Department of Agricultural Education and Communication (AEC) at the University of Florida.

*Clyde W. Fraisse* is an associate professor in the Agricultural & Biological Engineering Department, University of Florida.

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