

## Welcome

- Megan: Good morning, everyone. My name is Megan Haidet, and I am a program specialist with the National Institute of Food and Agriculture's Division of Plant Protection. I would like to thank you all for coming, and I'd like to welcome you here to our NIFA Listen Session, Investing in Science to Transform Lives. This listening session is one opportunity for our stakeholders to provide feedback, specifically about our science priorities, challenges and needed breakthroughs.
- Megan: So, I am very excited that you have come out this morning. This is the last of four in-person listening sessions we've done over the last month, but our listening session, our listening opportunity will stay open for another 30 days. We have a website that you can visit and share with other partners. It's at [www.nifa.usda.gov/nifalistsens](http://www.nifa.usda.gov/nifalistsens). Really easy to find on Google. We have a stakeholder input form that asks the same questions we've asked speakers here today to address.
- Megan: So, we have an agenda. I just want to let folks know we're going to stick to the agenda, but that's our guide for the day. If folks feel inspired to come up and speak after we've run through that folks that are on the agenda, that would be great. We'd really like to hear from as many stakeholders as possible.
- Megan: We invite each speaker to talk for up to 10 minutes. My colleague will be in the front here with five-minute and two-minute reminder signs to keep you on track. We hope that everyone is respectful of others in the room. So, if you need to take a call or a side conversation, please step out. We are recording this session, hence, the bright lights and the camera in the back. It is actually being webcast right now, and it will be available on the NIFA Listens website. We'll also have transcripts available. We'll have, eventually, a synthesis report of what we heard this year. You can find our 2017 What We Heard Report on the website as well.
- Megan: Please help yourself to refreshments. The bathrooms are back and around the corner. I'd like to introduce our team here from NIFA. We have Dr. Luis Tupas, who is the Deputy Director of the Institute of Bioenergy, Climate, and the Environment. We have Ms. Olivia Moreno, who is a program specialist in the same institute. We have Kelly Sprute, who is a communication specialist, and we have Dr. Jeffrey Steiner, who is the Director of the Division of Plant Production.
- Megan: We're going to start off with a brief presentation about NIFA, and why we're here, what we're doing, and a little bit about what we heard last year. So, please help me introduce and welcome Dr. Tupas, and we'll get started with the program. Thank you very much.
- Luis: So, thank you and welcome to this listening session. We're really happy that you could come. If there are new ideas that you've developed, after this listening session, we still have an opportunity for you to provide that information through our web-based system. I'm the Deputy Director for Bioenergy, Climate, and Environment. I'm also the NIFA

Liaison to the Western Region. That's why I was beginning to realize this morning I recognize a lot of you, and that's because we're here in the Western Region.

Luis: Dr. Steiner, also, is formerly from Colorado State. So, we are the folks over here who are very much interested in your perspectives, not just from the general domestic, but also from what you see is important in your region.

Luis: So, I'd like to give a little bit background about NIFA, and to talk about what we do. As you know, NIFA is the extramural science funding agency for the Department of Agriculture. Our mission is to invest and advance agricultural research, education and extension. Those three functions are very important to all of us, and we're trying to solve societal challenges.

Luis: We collaborate with many partners, leading scientists, policymakers, experts, and all of you here in the audience, and we try to find the solutions to the most pressing problems that are happening locally and globally. Through the scientific progress, through discovery and application, we really would like to see that science used to transform lives of the people that we serve.

Luis: So, this is a very general description of how NIFA prioritizes its portfolio and where it gets its information. Obviously, we are subject to the appropriations from congress through the farm bill and the annual appropriations bills. So, those give a lot of guidance on what our priorities are. We get information and guidance from the Secretary of Agriculture and the White House through their respective chains of command.

Luis: We rely on our subject matter experts like Dr. Steiner, who advise us on the different scientific areas that we should be investing in, and we look at all the states and the territories from their land grant and other institutions. You are also part of our internal stakeholders. Then we have external stakeholders, which this input process through our listening session is one of the means that we receive information from you directly. We receive this through your presentations here this morning, as well as any other information that you provide to us through our web portal.

Luis: So, we're here to invest in science and transform lives. These are the three questions that we have developed for this year's listening session. They're all trying to address your perspective and how you and your own subject matters are contributing to agricultural science, and that's what we would like to hear from you from. Below is the website of our NIFA Listen Sessions from last year and for this year.

Luis: These are the opportunities. We have our stakeholder input through the website, and that comment period will close on November 30. This is the fourth of our in-person events. We just completed the first three in those sites, and we're here in Albuquerque, New Mexico for this site.

Luis: This is how your input is considered and used in our strategic planning. It helps prioritize our science emphasis areas, so we can identify both our gaps and areas wherein we need to progress further. It can determine which programs may be redundant or

underperforming, and we'd like to hear from you on that as well. With this combined input from our own NIFA staff, those that we get through the listening sessions, and our other science emphasis areas, we identify the gaps and current portfolios and our potential future investments.

Luis: Last year, we had 599 total responses distributed in the manner that's shown here. 383 were from personal opinions, input from them, and 26 were from organizational input. So, we are looking at really both collective, as well as individual inputs into our stakeholder information. It's divided this way where the majority came from our university partners, as well as from our other partners in nonprofit organizations. The third bar, other, is broken up into these sections over here, where we have research institutes, coalitions, all the way down to statewide commodity commission. So, these are the people we've heard from last year, and we're going to hear from you this year, and we will take that into consideration of that demographics.

Luis: This is what we heard. We heard a lot about systems. The big challenges facing agriculture requires systems approach, being able to work across different disciplines, systems that also include economic, social, ecological and technical systems as well. We're looking also at solutions, where data and technology were needed to better manage agricultural systems. Extension, education and community development is central to improving agriculture, and the need to strengthen community between research and extension. Those were some of the main points that we heard from last year's listening session.

Luis: We did some data analysis, so can categorize the top 20 science priorities. You can see them here starting with data and technology, where 40% of the comments were on data and technology, all the way down to controlled environmental ag. So, we have a very wide range of input from stakeholders, and we are doing our best to make sure that we can address these as appropriately.

Luis: I'd like to take just a little bit of time to talk about the first two. The first one was on data and technology. We heard that from 124 organizational and 118 personal inputs, which is about 40% of all the comments. This graphic here is just a compilation of the different terms, keywords, that were pulled out for this theme, and the larger the word, the more often it came out or the more often it was emphasized.

Luis: The major areas were data itself, genomics, precision ag, diagnostics, robotics, gene editing and down to sensors. So, data has become a very important component of agricultural science that we need to focus on, but it also involves being able to look outside, so that we get the skills and subject matter expertise in this area as well.

Luis: The second large theme was on plant production. We got that from 99 organizational and 125 personal inputs. About 37% of the total input was on plant production. Again, crops and the word "crop" were the major keywords in it, but you see, consumer horticulture, you see organic, you see native and plant breeding is part of this.

Luis: Plants are the central commodity and focus in our agriculture-based ecosystem. All these comments were looking at not just plant production, but also soil health, ecosystem services, all the way down to plant breeding and test management. So, it's a very large topic. All of you feel or at that time in 2017 made this one of the top two topics in our stakeholder listening sessions.

Luis: So, this is juts more information to find more about NIFA Listens and what we heard. This is the website that you can go to to get that information. We really look forward to your input this morning. We really are happy that we're able to do this, hopefully, on an annual basis. The NIFA staff will be here afterwards. So, if you have any questions from us, please feel free to come and talk to us. Thank you for coming. We look forward to listening to what you say.

## John Talbott from Oregon State University

Megan: Great. Thanks, Luis. Enough about us. Let's turn it over to you guys. First up, we have John Talbott from Oregon State University. Just a quick reminder, because we are webcasting this, please try to stay at the podium, so we can capture your lovely faces on video. Thank you.

John: Thank you. You, obviously, weren't talking about me when you said lovely faces, but be that as it may. Yes. I'm John Talbott. I'm the Assistant Director of the Ag Experiment Station at Oregon State University. I appreciate the opportunity to share our comments with you quickly. I'll try to stay on time here.

John: So, greatest challenge that should be addressed, I think it's pretty obvious to all of us that feeding a growing human population with less land, less water, more urbanization, and a changing climate is the biggest challenge that we currently face, and then we have to do that in a way that's sustainable, both environmentally, economically, and also socially.

John: So, we would like to see more of research education and outreach focused on some of the following, not surprisingly, plant breeding research, but plant breeding research that's less about yields, and more about nutrition if we're going to feed an increasing population. Increased funding for specialty crops research. With growing middle class populations in the developing worlds and with the recognition that some of the crops that are available, the economically distressed populations, we need to give them an alternative. Certainly, specialty crops offer high nutrition, high productivity, and can be an important component of the food security.

John: Fundamental and applied research that reduces agricultural water use. Certainly, more reuse of water, and then simply addressing the fact that we have groundwater, surface water issues related to water quality and water safety. We would really like to see an expansion of capacity funding. I know that's not up to NIFA. That's up to congress, but certainly, we would hope you would work with us to expand capacity funding to the 1862s, 1890s, 1994s. I'll just use the example in Oregon, where we received about \$11 million in annual federal funding through capacity dollars. The state provides \$31 million

to match that, and yet, we have \$5 billion in farm gate value. So, bottom line is 11 million is woefully inadequate in terms of supporting a research enterprise of that scale.

John: Invest sufficient dollars in extension and education to improve consumer knowledge and improve their approach to consumer preferences. We waste so much food in this country because it doesn't look exactly right. That's our fault. To demonstrate to folks that an apple that has been tapped by a marmorated stink bug larva has a few dark spots on it, but guess what? Peel the skin off, it's the same apple. We don't have to throw those away.

John: Certainly, we need to educate our consumers more about pesticide, herbicide use, biotech crops, and the reality surrounding large animal production systems. Sometimes they're not pretty, but in order to keep food economically viable and to keep it safe and secure, we have to use some of these different approaches.

John: So, what breakthrough in science and technology? For me, I'm a tech guy, love technology, but the simple fact remains that most of our producers and even our researchers don't have access to the technology because we don't have access to the network, neither broadband nor cellular in rural communities. Large backbones that go, dark backbones that go to our communities to allow the schools and libraries access do not serve the cattle producers that's 50 miles from town.

John: We would hope that NIFA would work with us and with other federal agencies to come up with portable satellite-based cellular and broadband systems that can be deployed in areas that allow our producers and our researchers to use this new technology and to be able to test it in the field. The military has that capability, suitcase-sized broadband that's linked to a satellite that gives them 50 square miles of coverage. There's no reason why if that was more readily available, the market would make it affordable for others.

John: Then finally, access to broadband and access to cellular would provide our producers with access to our information to train them on the use of that new technology. E-campus doesn't work if you don't have access to cellular or broadband. Yet, these folks are unable to determine the return on investment they might get from deployment of the technology simply because we're unable to deliver the information to them to allow them to make that choice.

John: Top priority in food and agricultural research. Adapting an agricultural system to a changing climate should be our top priority. While uncertainty remains as to the movement of agroecosystems and water regimes around the planet in response to climate change, we can begin now to address what we predict may happen. This includes everything from breeding drought-resistant crops, produce crops that are resistant to likely new pathogens and pests, and currently in some systems and production methods that improve resiliency to catastrophic weather events and changing water regimes.

John: We would hope that we could entertain with NIFA the opportunity to engage with the Army Corps of Engineers, National Oceanographic Aeronautic Administration, Bureau of Reclamation and others to begin to change how we maintain control and provide water across the rural areas where water is important for irrigation that's based on the fact that there may not be a snow pack in the future. We may have the same water regime, but the water comes in the wintertime in the form of rain, and we simply lack the infrastructure to respond to a changing climate such as that.

John: Finally, how we can economically and environmentally sustain this new normal, and it's paramount to an agricultural production system that is available for future generations. With that, I'll close my comments. Again, thank you very much.

## Doreen Hauser-Lindstrom from Western Extension Directors Association

Megan: Thank you. Next, we have Doreen Hauser-Lindstrom from the Western Extension Directors Association. If you're looking for WiFi while you're in the room, we have the password is HPHK, HPHK all caps, and that's our WiFi password. You just enter your name and that password, and you should be able to access it. Thanks.

Doreen: Good morning. I'm Doreen Hauser-Lindstrom, Director of the Youth and Families Extension Programs at Washington State University. I also have the pleasure of serving as the Chair of the Western Region Extension Program Leadership Committee. I am here today by the request of the Western Extension Directors Association. This is the body that represents land grant university cooperative extension in the 13 Western state for Pacific Island territories. The West also includes numerous, numerous tribal nations and 13 1994 Native American land grant institutions.

Doreen: I would like to begin by thanking NIFA for investing the time and energy to seek out input from stakeholders. We appreciate all of you being here to listen. The West is unique in that over 80% of our public population lives within urban centers. This is side-by-side with the expenses of very diverse rural areas and sometimes even frontier areas. The Western Region covers five timezones. We share borders with Mexico and Canada, and consists of extreme diverse environments and ecosystems such as the Great Plains, high mountains, deserts, rainforests, frozen tundras, tropics and many miles of coastal areas.

Doreen: In the West, the public owns 40% of the land base. This characteristics create many challenges for diverse and ever-changing population, where many areas still do not have access to high-speed internet services. Because the majority of the agriculture in the West depends upon public lands and strong partnerships with federal agencies and organizations, we request that NIFA provide funding portfolios for the issues identified in the Western perspective and the Western agenda, which highlights the following six priority areas: sustainable production systems, natural resources, energy, community and economic development, 4-H youth development, nutrition, health and wellness. A complete Western agenda report and an executive summary is available on the Western Extension Directors website.

- Doreen: This is all background and in context that we will respond to NIFA's three questions. The first question asked about what's needed breakthrough in science and technology. One, we would like you to consider the following points. Please identify and understand the variables that lead to human health and wellness for all populations. Rural and urban, young and aging, indigenous and immigrant that are culturally sensitive and provide access to healthy, nutritious foods wherever people live.
- Doreen: Two, to understand and manage the impact of climate change and increasing variable weather that continues to challenge the availability of competition for water and the emergence of invasive species and continual adaptation of production practices and livability in our coastal communities.
- Doreen: Three, to encourage the secretary and agency heads to recognize and utilize cooperative extension as an outreach and engagement arm of USDA. Four, to include extension as a significant component of the NIFA grants, including the words with the research emphasis. Five, to support broadband initiatives for underconnected areas in our states and our territories.
- Doreen: These outcomes will require the integration of social science and multidisciplinary programs. They will also require engagement of the end-user in their approaches. This is specifically important at the intersect of food production, healthy communities and populations.
- Doreen: Your second question asked about what are our greatest challenges. We have six points for you to consider. One, in the West, issues related to fire, water, climate change, population growth, and invasive species and diseases are primary threads to agriculture that must be addressed. We encourage NIFA to be a leader in science-based decision making in these policy areas.
- Doreen: Two, the Extension Committee on Organization for Policy, ECOP, which is our national governing board for extension directors and administrators, has identified five areas of strategic focus. These may sound familiar to you. Nutrition, health and wellness, 4-H youth development, water quality and use, food production and food security, and community and economic development.
- Doreen: Three, significant increases in public and private funding will be needed to accomplish ECOP's goal of increasing youth development in 4-H from six million to 10 million young people by 2025, targeting a growing diverse youth population and addressing the needs of vulnerable and underserved youth and their families. We are asking the targeted funding be allocated, and also that 4-H youth development be incorporated into [AFRI 00:27:27]. In addition, a more rational and efficient approach to approaching the use of the 4-H name and emblem in support of 4-H is clearly needed.
- Doreen: Four, funding is needed for innovative extension programming to reach minority audiences, and to explore and expand the opportunities in urban agriculture, including food production in the urban environments. Five, we ask that NIFA actively support increasing capacity funds for the 1862 and 1890 institutions. These funds leverage state

and local investments. They allow us to respond quickly to emerging issues, threats and disasters, and they enable the development of local and regional relationships and the development of a significant volunteer base of youth and adults. All of which dramatically expand the power, the working power of these federal funds.

Doreen: Also, we ask that NIFA work to address the unequal resource allocation for the 1890 institutions. Not only is increased funding needed, but adding land grant universities without additional funding jeopardizes the entire 1890 delivery system. In addition, we ask you to increase the funding grants available for the 1994 institutions and the federally recognized tribal extension programs. Lastly, we strongly suggest that NIFA increase the number of faculty with significant extension experience on the grant review panels.

Doreen: Your third question asked for our top priorities. We have two. An urban/rural interdependence approach must be engaged to effectively address issues like fire, water, climate change, invasive species, and population trends that impact the health, livability, economies, and the recreational opportunities provided through the Western landscape. We ask that you pay particular attention to the potential move of SNAP-Ed funding to the NIFA budget, so that we are prepared to effectively and efficiently administer this very important program as part of a very comprehensive national nutrition education strategy.

Doreen: Each of these areas provides an enormous range of opportunities for NIFA to consider when appropriating resources among competing needs. We urge you to be mindful of the role and strengths of both the capacity and the competitive funding. Capacity funds provide a base for responding to unique state-by-state issues. They provide stability and an ability to seek competitive funds.

Doreen: One great example of the use of capacity funds is with our 4-H youth development program. That places young people on a trajectory of success. I hope that NIFA recognizes distinctive leadership roles in positive youth development that we play together through the 4-H youth development program.

Doreen: Competitive grants round out of wealth, functioning, funding system by providing in-depth targeted research, extension and education approaches that lead to the discovery, testing and application of science-based methods and community engagement. We have concerns about what appears to be the ... Yes. Got to take a breath here. Science, especially as it relates to public issues such as climate variability. I was doing so well for so long. NIFA can assist by providing objective insights and funding to engage people in co-creating solutions to difficult issues that can be adapted to local circumstances.

Doreen: Finally, we believe that allocating NIFA away from the capital region by just moving and relocating it will create challenges and reduce our capacity to develop important cross-agency congressional and other public and private Washington D.C. partnerships that align and strengthen outcomes for NIFA stakeholders.

Doreen: We also want you to know that we will work with you to make the future productive and successful regardless of the physical presence. Thank you for listening, and for my little blip, and for the opportunity to provide this input. Thank you.

## Sereana Dresbach from University of Guam

Megan: Thank you. Next, we have Sereana Dresbach from the University of Guam. Sereana gets the award, I think, for traveling farthest for our NIFA Listening Sessions.

Sereana: Thank you. I don't know if that's an award or not, but anyway, half a day. I am Dr. Sereana Howard Dresbach. I'm the Associate Dean and Director of Extension and Outreach for the University of Guam. I'm here today representing the insular areas. The insular areas as mentioned earlier are a part not only of the Western Region, but other parts of our land grant university system. As I'm here talking today, I'm not talking only for Guam, but also for our other partners, the commonwealth of the Northern Marianas Islands, the Federated States of Micronesia, American Samoa, and our Atlantic cousins, Puerto Rico and the US Virgin Islands.

Sereana: Our institutions in the Pacific represent 2.9 million square miles, almost the same size as the 48 mainland states. So, when we talk about what our needs are, think of it in that geographic term. I like to first thank NIFA for allowing us to be here and listening to what we need to talk about. That is the demonstration of engagement, listening, asking, understanding, contemplating, and discussing what we need to be doing as partners throughout this whole system.

Sereana: I'd like you think about our colleagues right now in the Northern Marianas Islands. Our land grant institution in the Northern Marianas College was devastated last week by Typhoon Yutu. Yet, our partners, our colleagues in that institution are still doing their jobs. They made sure their families are safe. They are cleaning up their island. They're rebuilding their college. They're making sure their students are safe, and they're still delivering extension education to help the citizens of the Northern Marianas Islands. I think that speaks volumes for the dedication to that mission.

Sereana: When asked about the questions that we were asked to talk about today, a lot of my responses on behalf of the insulars are very similar to what you've heard about Western Region. We just have a slightly different take on some of them. When talking about the challenges to agriculture and considering all of agriculture and what their responsibilities on research, education, and extension are, for the insular institutions, we're concerned with this exact same things just a slight different focus.

Sereana: In sustainable ag production systems, insular areas' main concern is food security and access to the sources of nutritious and affordable food for the populations of those islands. Our production abilities are limited because we don't have the landmass, but our production capabilities regarding oceans, water, such as freshwater abilities are vast.

- Sereana: The integration of research and extension to provide the best information on species genetics, water quality, climate change, market stabilization and sources, as well as the consumer demand are critical for producers everywhere. We are a partnership with our mainland counterparts, as well as being a source of their outlet of their products.
- Sereana: Research in cultivars thrive in shell soil, yet our nutrient-dense water droplet research regarding for irrigation, yes, on a tropical island, it gets 100 inches of rain we still have to irrigate. We need to know what the best research is.
- Sereana: Feed alternatives for livestock and fish production and food science research for preservation and for value added are all things that we need from the research base for us to deliver through education in our extension system.
- Sereana: Very specifically, the research to identify, contain, control and, hopefully, eradicate invasive species is a top priority for the insular areas. At the present time in the Pacific Islands, we identify new invasive species weekly. These species range from insects, fungus, bacteria, viruses, plants, reptiles, birds, and even the fuzzy worm mammals. They threaten what our agricultural production is. It threatens our forests, our fauna, our waters, our reefs, and thus, sustainability of the islands.
- Sereana: Research efforts from across all systems are critical for us in extension to be able to use. In response to talking about what's the most needed breakthrough in science and technology, for the insular areas, our national resource environment and our agricultural production cannot be separated. The water resources of the ocean and freshwater areas are critical for production of fruits, vegetables, and our protein sources. The cult of research, nutrient-dense food sources, multistory crops, pest-resilient plants are all needed to assist the insular areas with building its production capabilities.
- Sereana: Research in extension working together through funding sources that NIFA provides and working cooperatively to make sure that those research finding make it into a rapid response of implementation to control those invasives is the best scenario of science and technology working together for all of our citizens.
- Sereana: Specifically, when it comes to the top priority in food and agricultural research extension and education, what should we address? Again, it's very similar to what you've already heard. Building on the concepts of the rural/urban interface of producers and consumers, the insular areas have a similar model. It's the mainland insular interface and interdependence. While we may be limited on some aspects of traditional ag production that many of us know, me included, our insular production capability and capacity contributes to the diversity that's needed in mainland production and for our mainland consumers.
- Sereana: Research on the oceans and freshwater environments conducted in the insular areas are essential for our mainland counterparts to use in managing precious water resources, the protein diversity options, and climate understanding in all the disciplines. All disciplines that challenge science literacy is at all levels of our society, all sciences.

Natural, applied, social, economic sciences, that literacy is absolutely critical that everyone understands. .

Sereana: Insular areas are wholly dependent upon the policy changes of others. They affect trade, shipping, import, export, inspection markets and sources of our food. Science literacy and understanding implications is critical to ensure that marketing messages are not used to affect policy and those decisions because those decisions will affect if there's food on the shelves and if our citizens eat.

Sereana: In general, the concerns of the insular areas reflect the needs of the Western Region. We need sustainable production systems not only in the islands, but our food sources across the mainland need our diversity that we can provide. Our natural resources of water, land, fauna, and native species are our history, and they're our future. So, protecting them from threats is essential.

Sereana: Our energy demands are coupled with our geographic location have made the work and alternative energy a priority. Our community concerns in the insular areas are the same across the West and across our nation. We want vibrant villages, empowered citizens, informed decision makers, and strong economies. The youth of our insular areas are our future. Investment of them through education, leadership development, workforce skills and positive mentors in 4-H is essential for them to become leaders for tomorrow.

Sereana: Nutrition health issues lead the concerns of our insular areas. Unfortunately, several islands in the Pacific lead the world in mortality in diabetes and obesity. We have to do better for our future for the insulars to remain sustainable. Our nutrition programs such as SNAP-Ed coupled with the needs of other areas that we've identified, we've been able to specifically structure education programs for various age groups and various needs. Then partnered with social media, we know from that research that we are making a difference. It didn't happen overnight. It's not going to be solved overnight, but those issues are critical and that funding that NIFA provides is critical for us to continue.

Sereana: The partnership of research and extension to deliver that research-based, unbiased information is essential for the daily lives of our insular areas. The funding provided by NIFA provides that that partnership remains strong and we are a positive influence for those insular areas. For listening today, [foreign language 00:42:02]

## Jacqueline Fletcher from American Phytopathological Society

Megan: Thank you. Our next speaker is Jacqueline Fletcher from Oklahoma State University, and she has a PowerPoint. Thank you.

Jacqueline: Thank you, Megan. It is true that I had my career for 33 years at Oklahoma State University. I retired three years ago, and now I live just across the river in Corrales. I'm speaking not for OSU today, but actually for the American Phytopathological Society, for which I served as president in the past, and also as chair of the public policy board, and it is the public policy board that gathered information through a membership survey of

all of the members of APS. So, I'm delighted to be here to present those collective comments from the many members of APS. I also thank NIFA for the opportunity to share these comments.

Jacqueline: I'd begin by mentioning what the APS is or the American Phytopathological Society. The society focuses on plant health. This includes studies and efforts to understand the pathogens, the microbes, as well as abiotic stresses like drought, climate change, salinity, and so forth, and our efforts to translate these studies into management strategies to enhance productivity and sustainability of agroecosystems and the natural environment.

Jacqueline: APS is the largest society for plant pathologists in the world. In fact, we are, despite the name, an international society since about a third of our members are from other countries, actually, over a hundred countries, but our members from the United States represent academia, extension, government, industry, and many students, and from all the states and territories of the union.

Jacqueline: So, these are collective comments of this particular group. Okay. I've organized my comments into the three questions that were asked by NIFA. The first was the greatest challenge to be addressed by NIFA. As others have pointed out, we have concerns about an expanding population that will increase by 2050 to over nine billion people on the world. We know that malnutrition across the world, including in some areas of our own country, is a serious issue, killing 2.6 million children annually.

Jacqueline: In order to address the nutrition needs of this global population, our crop yields would need to increase by 70% to 100% to address those projected food needs should the population increased in that way.

Jacqueline: So, we would say that the greatest challenge that we'd like to have NIFA address is increasing the productivity and resilience of production systems, at the same time, reducing the negative impacts of crop production on the environment. There are a number of ways that this can be done, and we'd like NIFA to consider the strengthening of understanding of the stresses on plants, whether it is pathogens or insects or drought, salinity, climate change, nutrient deficits, et cetera.

Jacqueline: We think that there needs to be emphasis on optimizing landscape diversity. Agriculture in our country tends to be monoculture, but in fact, we're learning more and more about how monoculture really isn't monoculture because if you consider the microbiome and the phytobiome, which is more inclusive, including insects, nematodes, earthworms, everything that impacts the plants growth, these are the diversity of the ecological system that in many case has a significant impact on plant growth and health.

Jacqueline: Also, improving the diagnostics of crop production problems to ensure that our management strategies are appropriate and least harmful to the environment. We need to optimize the sustained efficacy of disease management tools, including reducing the emergence of antibiotic resistance due to overuse.

- Jacqueline: The second question was about top NIFA priorities for food and ag research, extension and education. We have four points to make here. The first is integrated management of agricultural microbiomes and phytobiomes, and as well as plant genetics to increase productivity and resilience of agroecosystems.
- Jacqueline: We can deal with the nutrition requirements of the growing population by putting more land into production or by gaining more food from the land we're already using. Microbes can help us do both of these things by allowing us to expand into more marginal lands and also substituting for environmentally harmful approaches.
- Jacqueline: Points in this area include the impacts of microbes on plant health, not just plant disease. Also, considering the other phytobiome constituents that I've already mentioned, and also studying how these are all affected by crop management practices, climate change, issues such as solar radiation, and so forth.
- Jacqueline: Second point that we'd like to make is to enhance the basis for predicting the emergence or reemergence of plant pathogens. Plant pathogens emerge or reemerge due to changes in climate, adaptation to new plant hosts, changes in production practices, increased movement of plant pathogens due to increased global trade and travel, and also to the movement of vectors, plant disease vectors, insect vectors mainly.
- Jacqueline: We need to better understand the biological relevance of pathogen detection and surveillance. What does this actually mean in terms of our productivity potential? How does the microbiome impact disease risk? We know in some cases it significantly helps to protect plants by the production of various exudates and nutrients. Finally, how do ag practices, as well as evolution drive the emergence and adaptation of pathogens?
- Jacqueline: Sorry. Okay. The third point is we need to have more resources put into forest health. Forestry pathology programs are on the decline around the United States, seriously impacting our capacity to deal with and minimize forestry diseases. We've had a number of these devastating diseases come into the country through various means, and the lack of resources in this area fosters conditions for disease spread. From forestries, they can move into nursery crops or vice-versa. We need a suitable infrastructure in the United States within USDA to address forest health issues in the future.
- Jacqueline: Five, oh, sorry, four, we need to pay attention to our critical national capabilities for supporting crop health, including and primarily investments, continued investments in the National Plant Diagnostic Network and as well as in workforce training. The NPDN or diagnostic network is one of the huge success stories that USDA has made in the past years, and it is the cumulation or connection of plant disease diagnostic laboratories in every state based on a regional ... Let's see. Does this have a pointer? Well, you can see there. It's based on a regional distribution and grouping of states, each one with a hub laboratory and all feeding into a common system.
- Jacqueline: This has increased our ability to detect and respond to pathogen incursions to a significant degree over the system we had previously, and it's very essential for plant

biosecurity, whether you're talking about natural incursions or accidental ones or terrorism. We also emphasized the need for education and training of youth in replacing the intellectual resource dealing with the crop productivity, even earlier than in our colleges and universities, but at grade school levels, in girl scouts, 4-H, and other resources.

Jacqueline: So, the final question was, what are the most needed breakthroughs that are needed to advance the agricultural enterprise? We selected two top priorities. One is inexpensive and reliable in-field diagnostic technologies and in-field sequencing for pathogen and microbe detection and identification. These are elements that are always critical, but we see a potential, great potential now for carrying diagnostics into the field with handheld devices that farmers themselves can use and help to make appropriate decisions about disease management.

Jacqueline: The second point is having to do with the big data issue that was mentioned earlier. We need accessible agricultural databases, and even more so, effective means for analysis and translation of the big data that results from our research into actionable, biological knowledge and crop production practices.

Jacqueline: That returns me to the final slide, which is the reiteration of the greatest challenge, increasing the productivity and resilience of crop production systems while reducing the negative impacts of crop production on the environment. I don't have this as part of my slides, but someone mentioned earlier the concern about the potential move of NIFA. This is something that members of the APS have been concerned about.

Jacqueline: We've had a letter writing campaign to contact our senators and representatives. We are concerned about the potential impacts on the ability of NIFA to interact with other agencies of stakeholders to reach NIFA on routine trips to Washington, D.C. We look forward to learning more about this, and interacting as that process moves forward. With that, I thank you again, and turn it over to Megan.

## Jon Boren from New Mexico State University

Megan: Thank you very much. Next up, we have Jon Boren from New Mexico State University.

Jon: Well, good morning. If you'll allow, which I typically don't do, I know we need to stay by the podium, and typically, I walk around, and normally, I don't have a script, but I will somewhat stay to the script the best I know how. Again, my name is Jon Boren, Associated Dean and Director for the New Mexico Cooperative Extension Service at New Mexico State University. I'm here today to represent the College of Agriculture Consumer and Environmental Sciences, which I'll refer to as ACES, the New Mexico Cooperative Extension Service and the New Mexico Agricultural Experiment Station.

Jon: I would like to recognize Dr. Natalie Goldberg sitting here, which is our Interim Associate Dean and Director for Agricultural Experiment Station, and Dr. Jay Lillywhite, which is our Interim Associate Dean and Director for Academic Programs. Also, before I begin, I would like to thank our colleagues from NIFA for investing the time and energy to go

across the country and taking the time to be here in Albuquerque to listen and take input from stakeholders. We really do appreciate that opportunity.

Jon: We also appreciate the opportunity to rank some of our top priorities in food agricultural research, extension and education. The mission of the education, research and extension embodied within the College of Agriculture, Consumer and Environmental Sciences at New Mexico State University is to provide a powerful knowledge-based economic and social development engine for the state of New Mexico.

Jon: The greatest challenges that we would suggest to NIFA to address in partnering with the college on its research, education, and extension programs is threefold. I'll go into each of these in a little bit of detail. The first being water, the second being health, and the third being economic development. I think you'll see my comments probably overlap quite well, I think, with some of the previous comments.

Jon: I would also like to add to those three. Developing human capital, precision agriculture, and agricultural literacy are also top priorities in food and agricultural research, extension, and education not only in New Mexico, but throughout the United States that we felt like NIFA should continue to address.

Jon: Also, increased capacity funding for research and extension is critical for the College of ACES at New Mexico State University. I would submit to you it's critical for the entire experiment station and extension system nationally. I hope we could focus efforts on this, and I'll have a few more comments related to capacity funds and competitive funding.

Jon: Regarding water, perhaps, nothing is more important to the future New Mexico as sustaining access to freshwater and assuring longterm sustainability of New Mexico's scarce resources. I know our colleagues that probably flew in from Washington, D.C. in Albuquerque looking out at the window, you can probably appreciate some of these challenges related to water.

Jon: The ability to sustain economic and community growth in New Mexico has a major limiting factor, again, that scarce water resources. Growth in agriculture, industrial activity, residential development, et cetera, all come with the demand on our water resources. The optimal management of water resources to support both longterm sustainability and economic and community growth is a multivariate complex challenge that will require continued investment and attention by the United States Department of Agriculture and NIFA.

Jon: Secondly, regarding health, we would submit to you that a healthy border is critical to the future economic and social wellbeing of New Mexico. I'd also submit to the healthy economic wellbeing of the United States. Unfortunately, persistent poverty, poor health and other socioeconomic challenges continue to affect a large number of New Mexicans. The need for solutions to these vexing human challenges is acute, since the state is second highest poverty rate in the nation. 31% of New Mexico youth live at or

below the poverty line, sixth highest rate of drug overdose deaths in the nation, and about 30% of New Mexicans are obese.

Jon: Again, researchers in the College of ACES, extension specialists, are often on the frontline in terms of not only research, but also outreach focused on understanding the socioeconomic and health challenges and developing actionable programs to affect positive change.

Jon: Finally, touch a little bit upon economic development, the College of ACES recognizes a large part of our work is focused on sustaining and improving the economics of agriculture in rural economy and community development ecosystems that support it. Quite honestly, I think that could be said for all of our land grant institutions.

Jon: Whether working towards improving agricultural productivity, developing downstream valued-added agriculture in food products or managing key resources, again, such as water that support the economic ecosystem, multiple faculty within the college focus on key questions pertaining to economic and community development.

Jon: Developing a specialized human capital require to sustain economic growth to meet New Mexico's demand for well-educated, skilled and capable life learners must continue to be a priority to us here at New Mexico, but I'd submit to you also a priority to our partners in the federal government.

Jon: Today and into the unforeseeable future, it's hard to overstate the importance of education, especially for higher education in New Mexico's economy and societal progress. Higher education facilitates productivity and efficiency gains across the economy. It also provides a positive return on investment for individuals and society, and therefore, increasing additional economic benefits.

Jon: It is estimated that there'd be nearly 58,000 job openings in the US for food and agricultural industry from now to about 2020 for college graduates. Over the same time period, it's estimated that we're only going to produce about 35,000 US graduates with degrees in food, agriculture and natural resources that will be available to fill those job openings, leaving about 40% of a void. Again, I think it's extremely important not only for our college but others to be key suppliers in the in-demand talent for large sector of the New Mexico or quite honestly, the Western economy in providing a void to these gaps. That's going to take an investment within our education system within these higher ed institutions.

Jon: The primary global challenge, and I think this was mentioned earlier of how to increase agricultural production without pressing more land into agricultural use is the key driver of innovation in agriculture. Striving to increase yield from every square foot of existing farmland, researchers are increasingly using digital and engineering-based technologies to create a precision agricultural industry. In addition, there's a significant need to improve agricultural literacy, and I know Sereana mentioned this earlier, but we need to keep in mind that the land grant systems are in a key position to help provide and overcome some of the misinformation and also, more importantly, probably, is to

communicate scientific consensus on agricultural production practices and their contributions not only to domestic, but also global food security and food affordability.

Jon: So, in conclusion, I'd like to conclude my remarks by, again, in asking NIFA to actively support increasing capacity funds for the land grant institutions. I know we've had a lot of dialogue, and there's been this conversation for a number of years, but I think we really are at a point that we need to provide some razor sharp focus on this. These funds leverage state and local investments. I know this will be similar to some previous comments, allow us to respond quickly to emerging issues, which are extremely important for us in the West. We face many issues that may be different than the rest of the United States, certainly different than the issues in Washington, D.C.

Jon: So, again, these capacity funds provide that needed flexibility to meet our clientele needs in the states. Also, enables us to develop local and regional relationships, the development of significant volunteer base, all which dramatically expands the working power of these federal funds we're able to leverage these. These resources provide the base for fundamental talent, for unique state-by-state stability, responsiveness and ability to seek competitive funds. So, again, the capacity funds are critical, so that we have the capacity to actually compete for the competitive funds.

Jon: One great example, and I know this was mentioned earlier, but given it's a flagship program of the Cooperative Extension Service, it deserves mentioning again. A great example of capacity funds is our 4-H program that places over six million of our nation's youth on trajectories of success. As mentioned earlier by Doreen, one of the goals is to move that needle from six million to 10 million. That's going to require an investment not only at the state level, not only at the county level, but also at the federal level.

Jon: Competitive grants round out a well-functioning funding system by providing in-depth targeted research, extension, and education approaches that do lead to the discovery, testing, and application of science-based methods and community engagement. So, the competitive is also very important in our budget portfolio in our partnership with USDA.

Jon: Also, it encourages, and I know this was mentioned earlier, and we as directors also need to be engaged in this process, but I would encourage NIFA to include extension as a significant component of all NIFA grants, and include awards even with the research emphasis, include faculty that have a significant extension experience on grant review panels. I think that that's important.

Jon: The last comment, I want to remind you that the land grant system provides user-informed, cutting edge research that addresses key issues and opportunities in the United States agricultural and natural resource systems, and a lot of other related areas that we've mentioned previously. Our teaching programs, and we don't want to overlook our teaching programs, bring research into the classroom and engage and inform students for careers in our field, and to be quite honest, careers that we don't even know about today. Again, it takes that process.

Jon: Also, our extension program connect people with the science of the land grant universities in ways to help and improve their lives and their livelihood. As such, I believe we can make a case that we really are the USDA partner who addresses the impact of critical issues, opportunities and challenges facing the country.

Jon: To go off script just a little bit, I think it's important that we continue this valued partnership. I appreciate our colleagues from NIFA taking the time to be here, and as Sereana had indicated earlier, I think it's always good when we can have open, frank conversations and discussions and would hope if there's any of these points that are made and you'd like to follow up, I'm not used to giving a talk and not turn it over to the audience for questions, so this is really odd for me, but nonetheless, I know my time is short. So, I'm going to ... Again, thank you all for being here. Thanks for the opportunity to provide some comments.

## Kelly White from National Initiative on Consumer Horticulture

Megan: Thank you. Is Kelly White here? Would you like to come up for to speak on behalf of the National Initiative on Consumer Horticulture? Thank you. I know the two other speakers on our agenda are not here at the moment. So, if you are feeling inspired to provide comment, please get ready because there may be an opening right after Ms. White.

Kelly: Thank you. I think I'm going to dispense with my slides, and I don't want to be redundant, maybe just the first slide, so that they can see the logo for the organization that I am representing this morning. I feel extremely humbled to be asked to speak on behalf of this new initiative, National Initiative for Consumer Horticulture.

Kelly: I learned of this organization. It was newly formed in 2015 when a group of people like you and I were brought together, a very small team, were brought together with a directive, something that they had to accomplish, and they realized when the six or seven of them sat down together that they needed a common denominator that would bring them together because they were spread. They were all these professionals from all these different backgrounds.

Kelly: What they realized was their common denominator was consumer horticulture. In addition to that, that realization of what was their common denominator also helped them to identify that there were voices missing from the team and the table. When I was sitting, listening at a national volunteer conference, I was listening to the story of how this coalition was formed and came into being. I was so moved by the fact that they really had thought it through so completely, those three legs of the table that have been mentioned over and over again this morning, the economics, the social implications, and the environmental, and how important all three of those are to our problem solving.

Kelly: We've heard all morning long about all of the problems that are facing our nation, and the desire to address these problems. I think one of the things that is missing and that we want to encourage NIFA to consider is that huge identity or entity called Consumer Horticulture. When we talk about consumer horticulture, we're talking about urban. When we talk about food and agriculture, we really tend to separate them. Yet, the

urban environment is a huge part of food and agriculture, and it's moving more and more in that direction.

Kelly: I'm not going to feed you a bunch of statistics, although I did have a bunch of that stuff. I want to share with you that I'm just going to look at gardening alone in the United States. 80% of the households in the United States garden in some capacity. It is a way to deal with food deserts and this whole idea that there isn't enough. 40 million acres of lawn, just lawns, 40 million acres, 1.9% of the land area of the United States is taken up in just horticultural gardens, ornamental gardens. It is the largest irrigated crop in our nation, gardens. I'm just talking about gardens. I'm not talking about parks and recreation and all the other aspects of horticulture that come with an urban environment.

Kelly: We use nine billion gallons of water a year on these gardens. So, when we talk about water quality and water quantity, this is a huge part of the issue. So, how does it fit economically, consumer horticulture? Where does it fit economically? In gardening alone, \$36 billion a year are spent in gardening. So, I'm going to make this really short because there's more important things I'm sure for you guys to listen to, but when I drove up this morning to park my car out front, there were three urban farmers getting into their green John Deere, a 4x4 gator, and they were putting all of their horticultural tools into their John Deere.

Kelly: This is a part of our world, and NICH hopes that NIFA will look at consumer horticulture as a common denominator. We all live in households. We all live in communities, and it is a mechanism by which we can start pulling those three legs together, that economic, that social, and that environmental aspect of our country, and the problems that it faces and begin to address them. Thank you.

Megan: All right. Is Ian Colburn here? Okay. He was going to be ... Yeah. I don't anticipate he's going to be here just yet. Would anyone else like to come up and speak and discuss your priorities, challenges or needed breakthroughs that NIFA could address? All right. Well, we may be taking an earlier break than said on our agenda. So, I'll give you a few more minutes to consider providing comment. We'll take our break now, and if everyone could hang out for just one second, we'd like to take a group photo. After the break, we'll come back, see if anyone else would like to provide comment, and then we'll have some closing remarks, if that's the end of the program for today. So, it is 9:45 now. We will readjourn at 10:10. So, please come up, and we'll take a photo, and then everyone can break, and we'll readjourn at 10:10 Mountain time. Thank you.

## Mark Bell from University of California

Megan: All right. Thanks, everyone. We've got some great mix and mingling going on here. I just wanted to offer one more opportunity in case anyone in the room would like to provide an unscheduled comment. Yes. Come on up. Wonderful. Please introduce yourself.

Mark: Thanks very much. For those who you can understand me, I'm not originally from around here. My name is Mark Belle, and I'm from the University of California. I'm with

the marvelous group, the Western ... What does WRPLC stand for? Yeah, part of WEDA. I'll just say it's part of that. So, as I was listening to the reports and as I was reading through previous reports and so on, there was a similar listening session in Sacramento last year, and we had a bunch of people go there.

Mark: So, one of the things that struck me is, yes, hearing all the topics, great, really important, but I think one of the needs and challenges, and I was just talking to Kelly during the break, is just the whole awareness of the value of what's done. I see that as a huge challenge. When I look at the work across the University of California system, as I look at the work that's done in other states, and as I talk to colleagues, what I repeatedly hear is we're doing all this good work, but we keep it in this little bubble, and we're trying to get the story out, but how well are we doing that? How well do the decision makers understand the value of what's done across all the land grant systems through all the partnerships that we have?

Mark: So, I just want to bring that up because to me, that is a huge challenge. I came in to the University of California system from elsewhere, and it has struck me that the incredible work that is done across the system and yet, we so often are hesitant to tell that story or we're not skilled to tell that story. We can write papers, and we can write good extension materials, but we're not necessarily particularly good at documenting and telling the impact of the work that's done through the partnerships and through the work. So, I just want to put that out there. So, thanks very much.

## Closing Comments

Megan: Anyone else? Okay. Then I'd like to introduce, again, Dr. Jeffrey Steiner to provide some closing thoughts for our session today.

Jeffrey: Again, thank you to you all of you folks who've invested your time with us. I'd like to just recap a few points. There's high points that I've heard as I synthesize this with everybody. Really, first of all, building on what Luis Tupas said is that this is really an ongoing engagement process that NIFA has, and we put it as a very, very high priority to listen to our customers, our stakeholders. I guess what really strikes me, a little bit of a self-disclosure, is that I spent 25 years with another USDA agency, the Agriculture Research Service, and I was on a land grant campus, Oregon State University for 17 years at that time.

Jeffrey: I really never became totally aware of the value of the three-part research, extension, education until I went to Colorado State, and then my time now with NIFA. Again, it's this type of partnership in that area that makes it just so critical for what we do to work because we at NIFA, yes, we've got the pedigrees, the degrees, the experiences, the decades of everything in working together, but we don't do the work that the educators, the extension specialists, the researchers do that are out there. We merely facilitate what you do through our funding.

Jeffrey: That's why it's so critical for us to hear what do the people with the boots on the ground who are out there have to say and what you say has an impact on what we do. That's

why this session, along with the other three that we had this year, as well as such as Sacramento last year, it's just critical because it just helps us not just to fine-tune, but to really help guide our programs, and how we work together within NIFA to deliver what you need to be able to do your jobs out there.

Jeffrey: So, building on that, I just have a few comments I want to go through, the things that really stuck out to me. I heard, and it's not the first time, is this whole thing about the need for not only the competitive grants, but the strong support for capacity programs. The value of that is not only hitting on these hot topics that are big at the national level, the world level, the state regional level, but it's when you need to adjust to an invasive specie that's coming to your state, that's affecting your industry, your commodities or whether it's a health issue that's emerging and needs to be addressed.

Jeffrey: If it wasn't for the capacity funds and that giving you consistent funding that your states then more than double, triple, sometimes quadruple or more, that work would not be able to be done. It's not only the importance of that from a research standpoint, but maintaining that infrastructure, to keep that moving forward, so that you can not only address those issues where you're at at home, but also contribute to a larger national effort, coordinated effort, as well as worldwide effort.

Jeffrey: So, we hear that, and we also appreciate the acknowledgement that we don't have the discretion to say where the funds go like that, but we do hear that. Now, I guess what came out of that as I think an important point, and that me as a Division Director can actually put into place, is that a number of you have said, "We'd like to see more of our extension personnel involved on a competitive grant review panels." We can do that in FEAT. We've been putting a huge effort in, at least I've only been in my role for less than two years, but there's been an ongoing effort to make sure that we have a representation of having system professors, associate professors, having full professors on panels, also having industry representatives on panels.

Jeffrey: We've been paying attention to, do we have people that are coming from urban areas or that are coming from the different states, the different regions, the ethnic background, who we have, whether they're coming from 1890s, 1862s, the '94s, but I think we can do a better job of getting more extension people in there. So, we'll take that home and make sure that that's covered.

Jeffrey: Also, just building on this concept of the collective value of your group, the groups we've been meeting with, it is not only the geographic distribution across the United States, but it's also thinking about it. I appreciated the Guam input. An area on the space of the globe for what's carried in insular areas and the territories is as large as the continental United States, and I think just, again, that perspective.

Jeffrey: Also, what struck me was the summarization of what came in there of, again, the transact between rural and urban, the consideration of not only the markets in those insular areas, but the contribution to markets here in the mainland, and vice-versa. Then also, what struck me was the strength of needing not only the terrestrial, but thinking about the aquatic, the high rainfalls, but the extension of the oceans and those things together.

Jeffrey: Again, all of that across everything in the United States with what our systems cover, the types of people that are there, and the health issues, the social issues, the workforce development issues, all this being brought together. Again, the overarching point brought in the very beginning, the systems approach. That's the components of the three parts of the leg of the land grant system, as well as extending that beyond to everyone else.

Jeffrey: Like I said, give me a little patience here. I see I had done a pretty good job because I actually hit my top points already. Okay. Here's some other good standpoints. The criticalness of funding, the integrated management, we've targeted on that. Again, addressing back to the point of the consumer horticulture, I mentioned during the break is that we've been tweaking our RFAs to make sure that that's called out just as much, as well as vertical agriculture, urban agriculture.

Jeffrey: Again, our mainstay and the biggest part of the US agriculture economy is still the commodity crops, and so forth, the food crops, but the large investment that we've seen, we've responded with the Specialty Crop Research Initiative, and how horticulture crops fit into that, and so forth, and the food needs of people. So, again, we really hope that we're hitting on place with that.

Jeffrey: Okay. I can't leave out. I think this gets ... This whole thing of the system is not only being the biophysical, but also the economic, but the point being made that we need to be thinking about social, we need to be thinking about human health in the context of a large body of that, and I think also the issue of nontraditional partners seeing the presbyterian health system that is here, known of that in other states, and the whole concept. I'm extending this now. The point about how food fits into people's health, and their lifestyles and changes, how that fits into our big systems grants, I think we can think about that more with sustainable ag systems, the way that's wide open not only in production, but also all the way the trails through that to human health, and so forth.

Jeffrey: So, I guess, I think I'll just leave it there. Megan, I think that summarizes the points that we've heard. Again, we just can't do enough to say thank you for investing your time and this is out of your bottom line, when you come to these things. There's other things that you're scheduled to do. So, we appreciate you being here. So, thank you.

## Ian Colburn from Rio Grande Farmers Coalition

Megan: Yeah. So, this listening session is about hearing from all of you. So, it's wonderful that we can turn on the camera and capture the comments of our next speaker, Ian Colburn from the Rio Grande Farmers Coalition.

Ian: Sorry to keep you all waiting. Thank you for not rushing out, and thanks to the organizers for turning back on the camera. I have my notes in various forms. So, I'm going to be switching between my phone and some paper here. First of all, yeah, like Megan said, my name is Ian Colburn. I'm from New Mexico. I've been farming in the farm community here for about five years now. This is my third full season on a small diversified vegetable farm in the South Valley practicing organic practices. This farm is

certified organic. I'm here today representing a group of food professionals, growers in Albuquerque's agricultural industry called the Rio Grande Farmers Coalition. We're a local chapter.

Ian: The larger national organization called the National Young Farmers Coalition, NYFC, that organization represents, mobilizes, and engages young farmers and ranchers to ensure their success. So, I'm sure maybe some of you know the average age of a farmer in the United States is now 60 or over, depending on the community. So, their goal, NYFC's goal is to help 25,000 young people to enter viable farming careers. By doing that, they're tackling critical, structural and economic barriers that prevent motivated young people from taking over their family farms or getting started in this industry.

Ian: So, to answer the questions that NIFA has post ... Well, first off, I'd like to say presbyterian does a great job. They were speaking an informal thing, and they've done a lot. I guess that's relevant because their work is supported by the NIFA grants. As a small farmer, they've been creating markets for lots of the produce and food products grown locally, and we always love to see that food make it to the people that need it the most. So, thank you for supporting that program. All right.

Ian: So, addressing the questions. The first one was the challenge, the greatest challenge. Here in the arid southwest, climate change is first in the forefront of our minds as farmers because of the uncertainty that it brings to our operations. This is a challenge that not only we're starting to face, but we know that we'll face through our entire careers. NYFC did a survey in which two-thirds of their members said they had already experienced environmental or weather-related changes in their operations, and half of those people contributed it to climate change.

Ian: In the 2016 survey that NYFC did, Western farmers, in particular, were affected by this, where the trend was 70% of respondents. Here in New Mexico, the average temperature is expected to raise about five to six degrees Fahrenheit by the end of the century if we don't change the way climate is going. This is in tandem with the projected overall decrease in the annual runoff and earlier snow melts, which directly affects us here in New Mexico, Our river, where many farmers get their surface water from comes from the headwaters in Colorado.

Ian: So, this past winter was the driest that we've seen since 2012, which is also an exceptionally dry year. Both of those years affecting farmers the following season with decreased yields, decreased harvests. So, the Colorado River Research Group, an independent team of scientists, focused on the Colorado river basin labeled the climate transition that we're seeing in the Southwest as aridification, meaning, a transformation to a drier environment and not just temporary droughts.

Ian: So, we don't need help getting through droughts. We need help adapting to the new normal. I don't know if it's within NIFA's purview, but of course, mitigating climate change should happen even before we or at least in tandem as we adapt to its negative consequences. All signs indicate that probably changes in the quantity of water available to farmers and ranchers will lead to reduced soil moisture, and needed changes in timing of irrigation. So, once again, the effects of climate change are going to force us to

change our operations in the negative direction with decreased yields, and making it harder to maintain good soil health.

Ian: Beyond irrigation pressures, we've also faced new pest pressures because of warmer days and nights. This past season on my farm, we encountered the largest and earliest population of a pest called a bagrada bug. It was the earliest that we've seen yet in the South Valley. There are few, if any, organic chemical controls for these pests, and they feed on a wide number of host plants, making them particularly damaging to a diversified operations as ours that rely on the food crops that these are pests for. According to our local extension agents, the influx of bagradas over the past five years is largely been due to warm or winter temperatures.

Ian: All right. Moving on to the technology and the question about a breakthrough. To help farmers and ranchers adapt to climate traditions, research funded by NIFA should prioritize deepening farmers' understanding of soil health and carbon sequestration, including variances in carbon sequestration across various types of ag land, including range land and drought-prone regions. Healthy soil enhances the effective delivery of water to crop root zones, making for more successful growing operation. Also, carry with it myriad other benefits, including increased productivity, reduced dependence on inputs, carbon sequestration, pest and disease control and increased biodiversity. Farmers recognize that investing in the soil is investing in the longterm viability of our farm.

Ian: So, more research investment is needed to better understand how we can most efficiently trap soil carbon, have our good soil practices, and then the tools that go along with that, and then appropriate technology, in particular. There are lots of technologies that exist, but farmers larger than us dominate the industry. Small scale, under 10 acre, diversified operations are the exception or minority in agricultural operations. So, we need tool skill to our size with our soil types, particularly here in the southwest. We face heavy clay soils with low organic matter. So, certain tools and recommended practices are more difficult to apply or not as appropriate.

Ian: For example, soil moisture monitors might be one example or other tools or techniques that allow us to transfer from cash crops to cover crops, so that we can both maintain a profitable farming operation while caring for our soil.

Ian: All right. Last question, education and extension. NIFA is well-poised to provide the research and knowledge that farmers will need to adapt to these changing conditions. In the 2016 survey of Western Farmers and Ranchers, the National Young Farmers Coalition asked, "What kind of water conservation and drought-resilient strategies producers used?" Of over a list of 20 practices, ranging from mulching to deficit irrigation, the most frequently cited conservation technique was building soil health.

Ian: The specific practices farmers use include cover cropping, crop rotation, mulching, all forms of building soil organic matter, which was cited as the primary conservation tool. So, this brings it back to soil health, which we see as both the primary factor on a successful farming operation, as well as our maybe strongest tool in the uncertain

weather and climate change that's coming to us. So, essentially, good soil health will give us the resiliency we need in the coming uncertainty.

Ian: Furthermore, NIFA should offer support for regionally led research into growing traditional and more resilient food crops and cultivating tastes and preparation methods among consumers. That, I mean that we'd love to see extension offices offer classes on preparing and tasting of indigenous food crops that may be already appropriate for the arid climate and may do better as the years go forward and water becomes more scarce, but are not currently commercial, and are not marketed, and we would have a challenged marketing to our current consumers.

Ian: Furthermore, over the millennia, indigenous people have refined these techniques to enhance resiliency and sustainability of agroecological systems that they manage, proving that this should be a successful technique going forward. A Hopi farmer and member of NYFC, Michael Johnson, shared with us that the conservation and production methods of indigenous farmers have cultivated are not often studied or recognized in the federal programs. So, it would be great to see NIFA highlight that and break that trend. Great.

Ian: All right. That concludes my comments on those questions for this NIFA listening session. Thank you for your time, and listening to small farmers in the Rio Grande Valley.

## Yvette Castellanos from Water Resources Policy and Initiatives

Megan: Thank you. So, that motivated one more speaker. I'm really excited to welcome Yvette Castellanos from the Water Resource Policy and Initiatives. She's going to provide some comments for colleagues.

Yvette: My name is Yvette Castellanos, and I work for WRPI, Water Resources Policy and Initiatives. I was going to wait till after lunch, but since we closed early, so I just wanted to get the comments from my colleagues on record. So, I am Projects Coordinator at Cal State San Bernardino at WRPI. On a personal comment, I just want to say thank you to NIFA for the listening session, and for the grant that helps ... Because I work with the projects and I work with projects and the students and all that kind of stuff, I'm really grateful that we work with the underrepresented population.

Yvette: So, I get to see the bios and see these students coming in and have these grants available, where they can work on STEM research. I have students that come in, and I'm grateful to see when the students come in and they're excited because they have interviews, they have jobs, and because of this mentoring experience, because they're involved, they're able to confidence and be able to go out there and go to the STEM careers and interviews and jobs that will also help their communities like we're talking about even the native communities and all that kind of stuff.

Yvette: On a personal thing, I go on a lot of reservations in California, so I see a lot the water problems and stuff like that. So, to have these programs, grants available to these population, it's great because it gives them that confidence that by being involved and

touching the research gives them that confidence to go and get those jobs and get those interviews. So, I'm really grateful that I get to see that, and they come in and they say, "Thank you," and they got this and that. So, I'm grateful.

Yvette: So, now, I'm going to read their, my colleagues, what their answers on some of the stuff. So, on the first question, when considering all of agriculture, what is the greatest challenge that should be addressed through NIFA's research, education and extension programs?" Most crops in the US are produced with high inputs of water, fertilizers and pesticides. Frequent and prolonged drought and competing demands on a limited water supply have created situations where less water is available for agriculture in California and much of the Western US.

Yvette: Nitrogen fertilizers are used to make yield-end quality, but have the potential to pollute ground and surface water, and emit the powerful greenhouse gas, nitrous oxide that further contributes to the global warming. Pesticides effectively reduce insect populations and maintain yield and crop quality, but also reduce biodiversity across broad taxa. Agriculture land compromises about 44% of the land area of the US. It is a managed ecosystem and as such, the impacts of management practices on sustainability and environmental quality are potentially enormous and consequential.

Yvette: Reducing water, fertilizers and pesticides in food production requires developing an integrated system with great technological capabilities to alter plant genomes fully utilizing remote sensing for crop and water management. Informing decisions with data, intensive analytics and including ecological and social impacts as part of the evolution evaluation of the greater agriculture production system.

Yvette: It requires revamping in agriculture education system to include disciplines outside of traditional agriculture and recognizing that much of the future workforce will have diverse backgrounds and be recruited from urban areas. Communities surrounding agriculture areas are particularly sensitive to agricultural issues. They will be key partners in this project, including outreach to communicate results and impacts of agriculture to their communities.

Yvette: For question two, in your field, what is the most needed breakthrough in science technology that would advance your agriculture enterprise? A transdisciplinary approach to coordinate research, extension and education, activities focused on lowering the impact of production by improving water and nitrogen use efficiency and reducing abiotic and biotic crop losses towards achieving the national 25-year goal of 50% reduction in water and nitrogen use, and a 20% reduction of crop loss.

Yvette: What is your top priority in food and agriculture research, extension or education that NIFA should address? We seek to strengthen collaborations of the California State University, UC community and industry stakeholders. The CSU's Water Resources Policy and Initiatives and Agricultural Research Institute provide research and educational communities that actively engage underrepresented students and benefit underserved communities among 23 CSU campuses with a total of 429,000 undergraduate students. 21 CSU campuses have Hispanic-serving institution status, providing an essential platform for engaging underrepresented communities.

Yvette: One top priorities are to develop and implement a multidisciplinary, multi-institutional research, education and outreach network focused on sustainability by targeting water, nitrogen and insecticide use. We want to develop a body of research-based knowledge to inform, educate, recruit, and train students at all levels to be part of a new generation workforce that is technically capable of ecologically aware and to develop collaborative outreach programs with community industry stakeholders.

Yvette: Also, one of my colleagues was mentioning a program that was called California Envirothon. It's an outdoor natural resources education program K-12 to get students involved. So, thank you for listening.

Megan: Okay. Last chance. Well, thanks again, everyone, for taking the time out of your days traveling far and wide to come here and give us your feedback. Just one last reminder, our online stakeholder input form will be open through November 30th. So, please share this opportunity with your colleagues, and we look forward to hearing more from you in the future. Thanks, everyone.