Introduction

The presence of plants has been credited with increasing people's productivity (Larsen, 1998) and happiness (Najafi & Keshmiri, 2019) while improving overall wellbeing and mental health (Hall & Knuth, 2019), which may be why plant sales soared during the COVID-19 pandemic (Sullivan, 2021). Prior to the COVID-19 pandemic, home gardening had already started to see growth in popularity and expenditures among U.S. consumers. The 2018 National Gardening Survey reported that participating households spent an average of $503 on gardening activities, and there was a steady 10% increase in lawn and garden sales between 2012 and 2017 (Cohen & Baldwin, 2018).

People's connection with plants is not always focused on personal wellbeing; consumers are also growing increasingly concerned with the environment and purchasing plants that are environmentally beneficial (Khachatryan et al., 2017). Additionally, consumers are concerned with standard plant production practices, like the use of neonicotinoids; a commonly used insecticide that can be harmful to pollinators (Blacquiere et al., 2012; Rihn & Khachatryan, 2016). Studies have indicated consumers are willing to pay more for plants that are advertised as pollinator-friendly and/ or wildlife-friendly (Campbell et al., 2017; Khachatryan et al., 2021). As consumer interest in adding environmentally friendly options to their yards increases, it is important to understand how prepared the environmental horticulture industry is to respond to consumer demand, which is the focus of the current study.

Ornamental plants are an important aspect of the broader agricultural industry, with the environmental horticulture sector (landscapers, lawn and garden stores, wholesalers, and greenhouse/nursery growers) having an economic output of $52.3 billion annually in the southeastern region of the U.S (Hall et al., 2020). Florida is the second highest contributing state in the U.S. in terms of environmental horticulture employment and economic impacts (Hall et al., 2020) and is the focus of the present study. In 2015, native plants comprised 15% of Florida's green industry sales (Hodges et al., 2016). Native plants are often considered wildlife or environmentally friendly because they help increase biodiversity, are adapted to the local environment, and are often closely associated with wildlife (Narango et al., 2017). While consumer demand continues to increase for environmentally friendly and wildlife-friendly options and other specialized plants, producers and suppliers may struggle to adapt and meet consumer demands (Hall et al., 2020; Westlake & Hunt, 2021). While COVID-19 increased gardening and plant purchasing behaviors among consumers in the southeastern U.S. (Campbell et al., 2021), how these trends relate to concerns about wildlife-friendly plant offerings during this time is unknown.

Agricultural communication and Extension professionals support the environmental horticulture industry in various ways, such as helping producers adopt new innovations that may benefit their operations (Lamm et al., 2017; Lim & Swenson, 2021). In the present study, a potential wildlife-friendly plant certification through the University of Florida is discussed with environmental horticulture professionals. The certification is aimed at providing a scientifically-tested production protocol for growers that involves effective and safe production practices with documented value for wildlife. These production practices will allow producers to provide and market high-quality certified wildlife-friendly plants to consumers. For the purposes of this study, wildlife-friendly plants are defined as plants that attract and support pollinators and other insects.

In the planning phase of a program, audience-centered research suggests agricultural communication and Extension professionals identify their target audiences and

conduct needs assessments (Boone et al., 2002; Lim & Swenson, 2021). Audience research is needed to support effective behavior change interventions, such as an initiative promoting new plant offerings, so benefits and barriers can be identified (McKenzie-Mohr, 2011). The present study was conducted with this purpose in mind.

Theoretical Framework

This work was guided by diffusion of innovations (DOI), which can be useful in understanding how ideas or innovations are communicated throughout a social system (Rogers, 2003). Here, the social system was comprised of horticultural industry professionals and the innovation under consideration was certified wildlife-friendly plants. Rogers (2003) described the diffusion of an idea as being first adopted by a small group of innovators, followed by opinion leaders known as the early adopters. The early majority follows, after which the late majority and laggards may adopt. At some point, this process may reach critical mass, when the diffusion process becomes self-sustaining (Rogers, 2003).

At the individual level, people move through a process where they ultimately adopt, or do not adopt. The process begins with gaining awareness of the innovation and then forming opinions of it. These opinions can take the form of relative advantage, compatibility, complexity, observability, and trialability (Rogers, 2003). When a new product, idea, or behavior is better than the one it replaces, it is said to have relative advantage. Compatibility is the extent to which the innovation aligns with existing values, norms, infrastructure, habits, etc. Complexity refers to whether the innovation is difficult or easy to use or adopt. Observability is the extent to which the results of using the innovation are readily visible or noticeable. Trialability is whether the innovation can be tested before making a commitment to adopt. Applied to the current study context, a grower's favorable opinion of certified wildlife friendly plants might include thoughts that these plants are better than other plants grown in the past (relative advantage), can be grown using existing equipment without substantial modifications of the nursery (compatibility), are easy to grow (complexity), have been highly successful for other growers (observability), and can be grown on a limited scale before committing to more (trialability).

During the innovation-decision process, agricultural communication and Extension professionals can play a role in raising awareness of an innovation. Later, interpersonal communications become important when individuals develop their opinions of the innovation (Rogers, 2003). Here, audience research is necessary to guide strategic communication and outreach efforts addressing the needs and perceptions of the target audience. When perceptions of benefits associated with a change are perceived as being greater than the barriers to adoption is likely (Garbach & Morgan, 2017; McKenzie-Mohr, 2011). For example, Lamm et al. (2017) reported that although U.S. nursery and greenhouse growers perceived the costs of adopting water conservation technologies were high, growers participating in their qualitative study reported "the benefits of increased performance that these technologies offered were worth the financial investment," (p. 116). Agricultural communication and Extension professionals can support adoption by removing or reducing barriers to change and highlighting the benefits.

Lack of knowledge can be a barrier to advancing to the decision stage of the innovation decision process, as was the case with farmers adopting biodegradable plastic mulches in three different U.S. regions (Goldberger et al., 2015). However, a knowledge deficit may be only associated with a subset of potential factors that hinder adoption of an innovation. Previously documented potential barriers to adoption among growers include the initial costs associated with adoption of harvest-assist technology (Caplan et al., 2014) and biodegradable plastic mulches (Goldberger et al., 2015) and the incompatibility of water conservation technologies

with existing infrastructure (Fulcher et al., 2016). A study of growers' interest in adopting sustainable production practices revealed that although many growers were interested in becoming certified sustainable, a lack of compatibility with existing tasks prevented them from adopting more environmentally-friendly practices (Dennis et al., 2010). Growers may be motivated to adopt new practices by the social prestige associated with producing plants in a certain manner, such as by using greenhouse or nursery technologies that conserve water (Lamm et al., 2017). Growers may also be more likely to adopt something new when the innovation benefits the environment (Goldberger et al., 2015) or results in a product of a higher value (Lamm et al., 2017).

Barriers, benefits, and others factors that influence adoption can vary greatly from sector to sector, or from one innovation to another within the same audience (Fichter & Clausen, 2021). The importance of conducting audience- and innovation-specific research to guide communication and Extension efforts cannot be overstated (Boone et al., 2002; McKenzie-Mohr, 2011; McKenzie-Mohr & Schultz, 2014; Warner, 2019). For diffusion to occur, a successful adoption process needs to occur among growers. Then, once the innovation is available (i.e., being grown), a subsequent diffusion process must take place among consumers (with growers serving as opinion leaders). The research presented here was conducted to explore factors that can support the initial adoption process among growers.

Purpose

The purpose of this study was to identify barriers and motivators to the adoption of offering potential wildlife-friendly plant options. This study was guided by the following research questions:

RQ1: What experiences do environmental horticulture professionals have with wildlife-friendly plants?

RQ2: What consumer trends do growers see?

RQ3: What are the benefits and barriers to adopting this prospective and new certification?

RQ4: What communication strategies are needed to make this wildlife-friendly certification viable?

Methodology

Qualitative methods were used to gain a rich understanding of individual perceptions of the motivators and barriers when it came to the potential adoption of the wildlife-friendly plant certification. The study included 11 individuals, all from different businesses, who worked in various capacities in the environmental horticulture industry, ranging from research and development at national and global firms, to large and small-scale nursery management, to landscape consultancy. To maintain confidentiality, specific identifiers such as employers are not included in our results and pseudonyms are used when presenting direct quotes from the interviews.

Sampling and Recruitment

We used purposive sampling through existing connections to the green industry to select participants (Etikan, 2016). The 11 participants were recruited through the Florida Nursery, Growers and Landscape Association e-newsletter (n = 6) and direct emails from colleague horticulture networks (n = 5). Interviews were scheduled at the participants' convenience from

November 2020 to January 2021 and conducted via Zoom. Interviews took an average of 40 minutes; they ranged from 30 minutes to some conversations lasting an hour.

During the interviews, participants shared their interest in a wildlife-friendly plant certification and the benefits and barriers to such an innovation. I analyzed responses after qualitatively coding the interviews and categorized each participant using DOI adopter categories related to their interest in adopting the certification: innovator, early adopter, early majority, late majority, late majority, and laggard (Table 1).

Table 1

Participant Pseudonyms, Adopter Categories, And General Description of Work Affiliation

Participant Pseudonym	DOI adopter category	Description
Bailey	Innovator	Large-scale nursery
Gavin	Innovator	Large-scale nursery
Mike	Early adopter	Global breeding company
Nate	Early adopter	National grower
Moira	Early adopter	Global breeding company
Mandy	Early adopter	Independent residential Landscaping Consultant
Mark	Late majority	Global breeding company
Pete	Early majority	Global marketing firm
Sarah	Early adopter	Small-scale nursery and botanical garden
Sam	Early adopter	National distributor
Tim	Innovator	Large-scale nursery

Instrumentation

Semi-structured, one-on-one interviews were conducted to collect data. An interview protocol was created based on the DOI attributes and research questions. Participants were initially asked about their role and what products and services their respective business offered. Specific interview questions included: *Can you describe your typical customer? Do you currently produce wildlife-friendly plants? What would be the benefits of producing wildlife-friendly plants? What has made it difficult for you to produce more wildlife-friendly plants? Please describe your level of interest in certified wildlife-friendly plants. What might prevent you from offering certified wildlife-friendly plants? What could be done to increase the acceptance of certified wildlife-friendly plants? What key information would be beneficial to you in deciding to offer these types of plants?*

Procedure

All interviews were conducted remotely using Zoom, a video conferencing platform, to comply with Covid-19 social-distancing guidelines. For consistency, I conducted all the interviews following the protocol developed by the research team and approved by the University of Florida IRB. Reflecting the semi-structured nature of the interviews, the interviews varied in length dependent on the conversations. Interviews were audio recorded and subsequently transcribed by a professional service.

Data Analysis

Interview transcriptions were qualitatively analyzed through two coding cycles. During the first coding cycle I used open, or initial, coding (Saldaña, 2021). Using DOI attributes as reference, codes were sorted into categorized themes. Further analysis led to a second coding

cycle, where I condensed the initial categories into six main themes or findings, discussed further in the results section. To conduct member checking, I provided participants with the summarized main findings from their interviews and asked for their feedback (Lincoln & Guba, 1985). No changes were needed according to the feedback received during the member checking process.

Researcher Subjectivity Statements

In qualitative research, the experiences and perspective of the researcher can influence the way in which the study is analyzed and interpreted. Preissle (2008) explains that qualitative researchers must acknowledge the subjectivity of their interpretation of the findings and how it can impact their research. As an agricultural education and communication graduate student, I was assigned this role through a grant-funded assistantship to help a multi-disciplinary group of researchers better understand the perceptions of the potential plant certification from an industry professional perspective. The other researchers were all faculty members with a background in agricultural education and communication, Extension strategies, and entomology.

Results

RQ1: Experiences of Environmental Horticulture Professionals with Wildlife-Friendly Plants

Participants were asked to describe their operation and role in the organization. Their experiences varied depending on the size and type of operation where they worked. Major themes addressing this research question were: 1) participants already offered some native or wildlife-friendly plant options for their customers, 2) production practices varied based on the operation, but all participants explained that they followed regulations, 3) all participants recognized the advantages of wildlife-friendly plants.

Participants already offered some native or wildlife-friendly plant options for their customers

Participants that identified as marketing professionals at large-scale (i.e., global or national) organizations described working closely with larger box stores. One participant was an independent consultant who works closely with residential homeowners in Florida. Four of the 11 participants were employed at either large or small-scale nurseries in the state of Florida. Many of the participants used wildlife friendly and native interchangeably.

When asked to describe their operation and what makes it unique, Sarah shared that her nursery operation works for a botanical garden that grows plants in-house and 30-40% of the plants they grow are native or wildlife friendly. Gavin, a large-scale organic nursery owner, shared "we grow over 250 species of native plants, all of them are pollinator friendly." Another large-scale nursery owner recognized the marketability of native plants, Tim shared that:

> When we bought this nursery in 1995, we started transitioning. The reason we bought it was because it was the first nursery in the country to grow sea oats. We picked up on that. That was our main concern when we bought it was sea oats and just a couple of other coastal species. From there, we started expanding out. We started doing the native viburnums and the stoppers, and things like this. Then, whenever the market crashed in 2008, we saw our income cut in half. It was like, well, we gotta do something different. What we did at that time, we got out—completely out of the non-native species business

and transitioned everything to native plants.

On the other hand, 6 of the 11 participants worked for large global supply firms or national distributors. When asked about their operation and what makes it unique, Mike described his customers as the finished grower, explaining that most of their attention is focused on the top 50 corporate growers that service the box store market. Another participant, Pete described that:

> I'm a product manager for [COMPANY]. I work in the R&D department to select new plants that we would bring to market. I work with breeders to make selections from the breeder trials to bring into our own trials to confirm the performance.

As a larger organization, Pete also explained opportunities within their existing plant offerings, "I know for instance, like with our shrub line, there's opportunity within that group of plants to offer food for birds based on the seeds that shrubs produce." These existing product lines that suppliers offer already include wildlife-friendly options, Pete also recognized that "more from an annual perspective or even a herbaceous perennial perspective, it's definitely geared toward the insect population, the pollinator population, what we're looking for and what we test for whenever we're testing these plants for other performance parameters." On the other end of the spectrum, one participant was an independent landscape consultant, whose customers were specifically interested in wildlife-friendly plants, Mandy explained that:

> My typical customer is a person that wants to transition their landscape to native plants, and they typically are doing their own personal research and their own personal initiative to make these transitions. It's mostly at this point small scale residential.

Regardless of operation scale, all participants had some relevant experience with wildlife-friendly plants, which indicates the prevalence across the industry. The participants' varied roles within the industry and different customers showed a demand for these plant varieties at many levels.

Production practices varied based on the operation, but all participants explained that they followed regulations

When asked about their existing production practices, all participants explained they followed existing standards. All participants described balancing production quality and quantity at all supply levels. Nate, a national grower shared,

> Our production practices are we follow established guidelines at both the federal and the state level would be point number one. Point number two, with a lot of this, it's about biomass, getting that material. For us, grow things responsibly, and get healthy plants out there that work for the consumer, and then the consumer is able to establish their little niche, their little microenvironment [to] support wildlife as they see fit.

Offering a global breeding perspective, Mike explained as a large agrichemical company his organization has implemented an internal policy to move away from neonicotinoids through "a couple different certifications" in response to amplified concerns. Mike also shared that, "Now our chemical business is looking for different chemistries that aren't going to have the baggage of neonics."

As a large-scale nursery grower, Bailey shared they're cautious at work, however, they use specific chemical solutions such as fungicide "that's a little stronger because it's a larger production scale" because "If we have an infestation, sometimes it's harder to control in a larger nursery than in a smaller case." At her home Bailey has a part-time nursery, she explained that "I do very minimal treatments. I do a lot of [integrated pest management]. Most, if any spraying is all-natural products." As an organic nursery operation, Gavin said "we grow Florida native plants in a sustainable, organic fashion."

All participants recognized the advantages of wildlife-friendly plants

During interviews, participants were asked about the benefits of growing wildlife-friendly plants in landscapes. In addition to environmental benefits, participants also explained the market diversity these plants offer and current initiatives within their organizations or across the industry with which they are familiar.

Environmentally, Nate explained that wildlife-friendly plants are usually better garden performers for homeowners because, "most of them are closer to native species and a lot of them are drought tolerant, or they have additional sustainable traits that are worthwhile and help the home gardener to be successful." Similarly, Gavin said "by utilizing native plants, it becomes pollinator/wildlife-friendly automatically." Many of the participants recognized multiple benefits and uses to wildlife-friendly plants. Bailey explained that,

> Some of the plants that produce something that's edible for us is also edible to wildlife. There's crossover there. Watching wildlife visit their gardens, I think that has a greater appeal than maybe a hybrid variety that isn't going to bring in as much pollinator activity.

Sarah shared that in the botanical gardens they incorporate pollinator plants because a lot of visitors come to take pictures of the butterflies, "we have a lot of birders, big birders that come to the garden, and then people just love the butterflies." Mandy works with homeowners to convert their yard to a native landscape. She explained that many of her customers are interested in attracting butterflies, birds, and bees.

Mark volunteers as a board member on his neighborhood homeowner's association. He said the neighborhood consisted of a small variety of plants, "every building has a minimum of four crabapples, one on each side. Every building had the same potentillas, even though they're not hardly long term in this area." Mark explained he has been focused on establishing a more diverse landscape within the neighborhood. Like the landscape conversions that Mandy works on, Mark is working to change the original landscapes builders have planted in order to bring in more diversity within their residential environment.

Wildlife-friendly plants have advantages that extend beyond environmental contributions. Bailey explained that offering wildlife-friendly plants attracts a larger market of new customers, and existing customers can come back for more variety. In response to this growing interest in diverse wildlife-friendly plants, Tim shared that his nursery has started a containerized wildflower program. He continued with, "it's a big program for us. I want to say that's 25 to 35 percent of our income." Similarly, Bailey described the niche wildlife-friendly plant markets that her nursery has turned to:

> The nursery that I work for during the week is both wholesale and retail, as well as website, mail order business. That nursery specializes in wildlife food plot trees, landscape trees, flowering trees, and fruit and nut trees. The wildlife food plot tree is a segment that there aren't that many nurseries currently involved with. There are more and

more starting up each year because they're realizing that that is a good market.

Current Initiatives

Many of the participants were able to share some of the current wildlife-friendly plant initiatives happening within the industry. Nurseries specializing in wildlife-friendly plants already offer numerous options for their customers and are working to provide even more. Bailey said, "I have a lot of customers involved with Audubon, Sierra Club, Native Plant Society, that kind of stuff." She also shared that the nursery offers edible plants, ranging from fruit trees to herbs.

At the botanical gardens, Sarah explained the gift shop "tries to sell some of the same things that we're growing for the garden as well as other things that they can get from other nurseries to compliment what we're doing." These smaller nurseries and gardens are creating programs and initiatives that encourage customers to consider wildlife-friendly plants that can also be classified as native or edible which compounds the advantages and appeal of these plants.

The larger garden centers and plant suppliers rely on market trends to guide development and production. These operations are also responding to the heightened interest. Professionals that work with larger operations shared what they are witnessing when it comes to wildlife-friendly plant offerings. Regarding labels and information, Mark explained that the typical garden center selling plants for pollinators will generally advertise that. As the head of marketing for a large horticulture organization, Nate explained working with larger big box garden centers:

> So historically, our business has been focused on vegetables and herbs, and so really haven't had that same wildlife support. This past year we went national with Lowe's. In 2021, we've got national programs, not only with Lowe's but with Walmart. Specifically, with our Walmart business, we've got a companion plants program, so that is perfect. We're looking at companion plants with two different lenses. One it can help repel bas insects away from your tomato plants, but also attract pollinators. It is new for our product line. I have to be honest with ya, but it something we are leaning into, and we'll put more focus on in the coming years.

These products are sold as 'companion plants' in that these work for the customer by having multiple values. For example, lemongrass is known for attracting pollinators while also repelling mosquitoes, flies, and ticks.

As for breeding these plants, large-scale suppliers are looking for specific characteristics attributed to each when promoting the plants to growers. At a global horticultural firm, Pete shared they carry pollinator-friendly plants, "As we look at these plants in our trials, we make not of the fact that, "Oh, look at the number of butterflies or bees that are on this one particular plant." These occurrences are considered favorable characteristics noted during plant trials. At the botanical garden, Sarah explained that over the last five years they have expanded the garden and these newer areas have been "planted with primarily 80% native plants, specifically for sustainability of pollinators." She continued by sharing that this past fall,

> ...our theme was our pollinators, so a lot of displays that we did were focused on a combination of pollinator houses along with pollinator plants and primarily native, but also some non-native pollinator plants.

Likewise, Gavin is participating in a current wildlife-friendly plant initiative by partnering with another nursery to change public perceptions on sod and the available alternatives for home landscapes. Mike explained that homeowners interested in converting their landscapes are wanting something to nurture, "...and it's good for my mental health, and it's a perfect thing for my social interactions."

RQ2: What Environmental Horticulture Professionals See with Consumer Trends

Participants were asked about consumer interest in wildlife-friendly plants. Major themes included: 1) a new generation of gardeners, 2) consumer transparency with production, and 3) COVID-19 behavior changes.

A new generation of gardeners

Most of the participants described a new generation of gardener emerging within the horticulture market. As an independent landscape consultant who works closely with homeowners to convert their landscapes, Mandy shared:

> I do get the sense that people feel in general that there's a shift in the environmental awareness that people—come from the message of, what can I do as my small part to help the environment?

Likewise, larger horticulture organizations like the one Pete works for are noticing this consumer shift. He explained,

> I think that's being driven a lot by what's in the news, in terms of the native bee population or even the domesticated honeybee population decline, and the concern that we aren't supporting the environment for those insects to thrive.

Mike described the current trend and enthusiasm for indoor plants among young adults, who reside in apartments or rent homes. He predicts that as these individuals grow into owning homes or land, they will transfer their interest in plants to outdoor spaces. Wondering if,

> ...instead of talking about their philodendron that they just rooted, they're talking about their lantana that they've had for 18 months and thousands of butterflies on it or what not? Because it's all the same experience.

This observation of a new generation of gardener was also noted by nursery owners. Tim who is seeing younger populations becoming homeowners and visiting the nursery to find plants that will improve their landscape. He shared,

> They don't want anything to do with non-native species. What they are looking for is something they can entertain their children with. They want them to see the wildlife, the butterflies, the hummingbirds, all the pollinators, everything that goes along with a healthy environment.

Gavin had similar experiences on the retail side of his operation, customers seek his store out specifically for their native plant selection. On the commercial side he said, "I think the landscape architects and specifiers are realizing the benefit of adding more life to a landscape and having a functional landscape."

Consumer transparency with production

Participants noted that consumers are concerned about the use of neonicotinoids during plant production. As a grower, Bailey is aware of the consumer concerns:

> Many consumers today, especially with wildlife concerns and pesticide residue and things like that, are really wanting to be able to trust what the business is saying about whether something has been treated with a particular pesticide, or fungicide, or pretty much an herbicide, or what have you that could affect what it is they're trying to raise in their yard.

Environmental horticulture professionals should adapt production practices and enhance communication efforts when it comes to engaging with consumers. Moira explained, "Just connecting with the consumer and giving them the information so that they can be successful and confident [with gardening]. That's how you create gardeners."

COVID-19 Behavior Changes

Interestingly, none of the interview questions explicitly asked participants about COVID-19 impacts on the environmental horticulture industry. However, participants shared the change they've noticed among consumers since the pandemic. When describing the advantages of wildlife-friendly plants Bailey said that the greater ecological purpose these plants serve is appealing. "Especially now that so many people are working from home or teaching their kids from home, they're really enjoying and exploring their gardens." A perspective offered by Nate was:

> Historically, a lot of our customers tend to skew female, but 2020 and COVID brought a lot of males, 25 to 35, 40 years old with kids, so basically young dads. There are a lot of young dads going out and shopping, certainly on the vegetable side of the equation.

As an employee for a national distributor, Sam has noticed the growing popularity as well. "People are nuts about gardening, which is fabulous. We're very fortunate that we have this renewed interest."

RQ3: Benefits And Barriers To Adopting The Prospective, New Certification

Major themes gathered from questions on the benefits were: 1) relevant to growers and consumers, 2) university support and validation and 3) existing programs that could support this certification. As for barriers, the major themes were: 1) plant performance, 2) certification process and standards, 3) certification cost, which impacts the 4) certification's market feasibility.

Relevant to growers and consumers

When asked about the benefits to adopting a potential wildlife-friendly plant certification, professionals affiliated with larger organizations said it will increase their relevance within the gardening market. Moira shared, "Every year it's definitely a trend that we offer plants that are more wildlife-friendly or pollinator attractors or require less chemical inputs to produce." These attributes are hoping to be combined through this certification. Sam, also affiliated with a larger organization, shared that the certification "would be terrific, if it works." He explained that many

growers would be open to a protocol and a cultural program for a certain crop that can be successfully repeated. From a smaller scale perspective, botanical garden grower Sarah shared:

> I think the benefits, especially for our gardeners, is that they can be lower maintenance, less inputs in terms of fertilizers, pesticides. They last longer in the garden so we're not having to change things out as often, and of course just attracting more butterflies and pollinators and things like that is an attraction.

Similarly, Gavin offered that the certification would be accepted by growers if it included an integrated pest management program with a protocol for growers to use on wildlife-friendly plants.

University validation and support

Many of the participants voiced that having third-party validation from the University would be a benefit to the proposed certification. Gavin said, "anytime the University gets behind something with statistics and scientific background, it certainly helps make the choice easier for the consumer." Likewise, Mike shared that the organization he works for would be "definitely interested in any type of third-party validation." He continued by stating, "That's where we see the most benefit, especially where universities come in because it's not our company saying it. It's the University of Florida saying it."

Participants offered examples of current initiatives and programs that would benefit from the certifications. Moira works for a global breeding company and felt that its marketing and sales departments would be interested in the certification. She also shared that,

> For example, we put together some pollinator-attractor combos that have annuals and perennials in them. We did all the testing on recipes and stuff like that to give to growers so that they could produce these combos for retail. Like three or four different varieties grown together in one container, so maybe like a Phlox, a Gaura, and a Dahlia, or something like that. A Gaillardia, a Salvia, and maybe a Lysimachia or something, so all the components have a either pollinator or wildlife friendly or sustainable background.

Existing programs that could support this certification

Participants recognized the marketing potential of the certification. Pete shared the organization he works for considers plants that are wildlife-friendly to be a positive attribute and "something we can market. Being able to certify, have some official certification, would definitely help us." He specified that a certification "would just give us a level of confidence in our marketing if it had that certification or if we had guidelines to use to figure that out." With large suppliers already creating pollinator or wildlife-friendly plant combinations, the certification can enhance current initiatives by offering third-party validation, a growing protocol, and customer education on these products. Nate shared:

> My bias would be to focus on the endpoint. What are good plants that can be environmentally friendly, economic to produce but provide a tremendous amount of bang for your buck? It truly is generating a lot of pollen, or a lot of nectar, or a lot of seeds, or a lot of whatever to fulfill the mission.

Plant performance

In addition to the benefits of a wildlife-friendly plant certification, participants also identified potential barriers.Participants expressed that plant performance was also a barrier when considering the certification. As a grower for a local botanical garden, Sarah explained, "If it's something that can be used in a way that delivers control that we need to be able to control what we need to be able to minimize pest damage to plants, then yes, we would be interested in that." She also described that, "The other challenge I would say is just the look of these plants in the garden.... people are looking for a certain aesthetic and some of these plants are just not very showy." Oftentimes, consumers are looking for bright, flowering plants to add to their landscapes. Moira explained that it's a "learning and education curve." Educating consumers on the benefits of wildlife-friendly plants and shifting demand away from primarily appearances and more so toward functional landscapes.

Plant quality that meets the consumer's expectations was a key factor for the participants. From a global breeding perspective, Pete shared, "We're looking for plant performance and how well that plant grows and blooms for the consumer."

Certification process and standards

Participants were curious about the specific process behind the certification. Depending on how the certification is defined and where it is in the supply chain will impact how organizations can envision their participation. From a plant breeding perspective, Mike shared,

> Our participation in that would—I don't know where we would fit into that mix unless if it's farm level, or seed level, where it starts. It would be interesting, but in general, farm-level certifications, because there are so many coming at us all the time, it would come down to a cost-benefit.

Nate also wondered where the certification would fit in his operation. "I think it's quite frankly, something we are already doing as a business. I think the devil is always in the details. It sounds interesting. With any of these programs, how is it being managed?" He continued by stating:

> If the program was not well defined, if the program was poorly managed, and if the program was slow to respond to an ever-changing environment. From a business needs standpoint, if it is expensive to administer, we would not want to add a bunch of costs to a program that did not really add any benefits from to the environment and our customers, including costs.

Pete explained that "There's different levels in our industry, there's different levels of concern for what's used on those plants during the production, in terms of chemicals used." Similarly, Moira discussed an existing program and was interested in how this certification would compare. She said:

> If it is a certification or something, I would say it needs to be relevant. The All-America Selections (AAS) program gives us a certification or a score or sometimes even an award for having the best, and we can use that as special recognition to help drive sales to those varieties that performed in the AAS. I would like to know how [this potential certification] would compare to AAS. We would need to know what the certification signifies, like what does it mean? What do you have to do to be certified? What makes it

a certified plant?

Certification cost

Another barrier to potentially adopting the certification was cost. Participants from large organizations to local nurseries expressed the importance of funding and affordability. Pete said, "From our perspective, the plants that we sell are probably the most expensive plants on the market. If there was an additional cost to having that certification, I don't know it would bother us so much." Comparatively, Pete explained that smaller organizations might be more hesitant because, "If they have to pay something extra to get a certification...that might be an obstacle, the cost of something like that." Bailey, who works at a large, local nursery shared the same sentiment. "I think the main thing that would be prohibitive would perhaps be the cost of such a program and how often inspection would be for certification."

Certification's market feasibility

Finally, participants discussed market feasibility of the certification as a barrier to consider. Mike noticed "There are attempts to leverage a lot of energy around pollinators in particular." He continued by explaining the climate of the horticultural market:

> I think the challenge with horticulture and the market in general, especially the box store markets, it's very much an impulse-driven market, so people are buying what's in color. The saying is "color walks." A lot of consumers, if it's an informed consumer, they know what they're going for. They're going in, and they're buying it. I'd say that's probably a customer that's most likely going to shop more of the independents.

As a national distributor, Sam described the differences between large and small operations. "I think they are all interested. It depends on the size of the operation, and it depends on their marketing channel." Deciding to introduce the certification to a big box retailer would require a lot of specific information and promising results. Whereas smaller garden centers are interested in trying newer products for their customers. He explained:

> For instance, if you wanted to sell to the big-box stores, you would probably have to have an entire program laid out with all the features, benefits, price points, delivery times, scalability....The other side, the smaller garden centers – I would say the garden centers that are looking at the future and want to have something that's different and novel and appeals to their customers, they might be willing to try smaller programs and product lines and explain that to their customers.

RQ4: Communication Strategies Needed To Make Wildlife-Friendly Certification Viable

During all the interviews, participants expressed the significance of proper education and communication to encourage wildlife-friendly plant certification adoption. The two main themes gathered from these questions were: 1) professionals find themselves in educational roles and 2) the complexity of this certification can be reduced through effective consumer education and communication efforts.

Each participant shared examples of how they communicate about their products. Overall, the suppliers communicate products to growers and growers educate consumers on specific plants and care techniques. Gavin explained:

> There's always a learning curve, no matter what you grow as a grower. It's up to us as suppliers to help the specifiers, and our regular customers select the proper plant for the proper place.

Gavin runs a native plant nursery and faces challenges when it comes to communicating about plant quality versus growing standards. He shares:

> Even though we are not organic certified, I follow the standards of not using harsh pesticides. That does add an extra challenge, but I think as long as we are working with specifiers, we try to help them understand that having a few holes or eaten sections in that plant is what's supposed to happen. If something's not eating your plants, then the system isn't working.

Nursery owner, Tim, shared that he recently received a photograph from a customer asking to identify a weed in their yard. Tim identified the plant as native and advised the customer to leave the plant and allow it flower in the coming weeks. As an independent landscape consultant, Mandy advises her customers to consider native plants and oftentimes educates them on the benefits of having these in their landscape. She noted that, "I operate at probably a good 95% natives. There's always some pushback from people who want nonnatives."

Many of the participants emphasized the importance of communicating directly with consumers and noted the complexity of new, certified wildlife-friendly plant purchasing can be reduced through effective consumer education and communication efforts. Moira explained "Gardening can be really a year-round thing, so keeping gardeners informed with content, educated, and with relevant products, that's our job. That's how we ensure our success." Comparably, Nate shares his education and communication efforts:

> ...can help our customers be successful period. In this day and age, where information is easier to acquire, easier to analyze, hopefully, the combination of having a pro-environmental stance, knowing our customers are looking for that, how we can identify the right plants. Help them understand what the right plant for their environment is...for example, get more light or less light, colder or warmer temperatures...We have done some of that. I know we will continue and quite frankly, lean into that whole piece even more in the future.

Complexity of this certification can be reduced through effective consumer education and communication efforts

Participants felt the certification program would need to be supported by communication materials that informed both growers and consumers about the plants. Specifically, creating a rich narrative that supported the science behind the certification. Mike described:

> The message, the story, these plants have such great stories how they're developed, how they're bred...The consumer doesn't even have the opportunity to learn the story. I think it's that awareness, labeling, getting the retailers to commit to a labeling standard or information at the point of sale.

Incorporating a strong narrative around the certification allows customers to connect with the products and the environmental advantages associated with these. Mandy, the independent landscape consultant, thought that certification should not only indicate sustainable growing standards but also:

> ...They're doing this to help these creatures interact with these habitat plants, and this is the end result. When you get that plant into your landscape, these are the things you can be looking for. I think a certification that targets that [information] and has the funding and the student power to create a more robust interactive type of information deal – that would be powerful.

Many of the participants described a branded program that allowed consumers to connect with growers and producers that offered certified plants. Gavin suggested "Creating possibly a branding program similar to the Florida-Friendly Landscaping Program™, but just expanding that or changing it all together." The ideas offered by participants all pointed to creating a program that supports the certification through communication materials like social media, a website, QR codes on labels, and digital or print materials at retail centers.

Conclusions and Discussion

The environmental horticulture industry continues to grow, and producers must adapt to changing consumer demands. Many consumers are concerned about the use of neonicotinoids and their impact on pollinators (Khachatryan et al., 2021) while forces such as the COVID-19 pandemic have driven increased interest in gardening (Sullivan, 2021). Our first research question explored environmental horticulture professionals' experiences with wildlife-friendly plants. All participants had either an understanding of or involvement with wildlife-friendly plants. Those who worked as growers at nurseries described specific varieties offered for their customers. Likewise, larger organizations had existing initiatives with big box stores to offer wildlife-friendly plant options from herbaceous shrubs to fruit trees. Participants identified the advantages of planting wildlife-friendly landscapes and recognized the advantages of meeting the needs of consumers who are increasingly concerned about neonicotinoids. This indicates that a variety of environmental horticulture businesses are already beginning to adapt and respond to consumer demands. These findings suggest strong perceptions of relative advantage and compatibility, two characteristics that should facilitate adoption of certified plants when they become available (Rogers, 2003).

Our second research question centered around consumer trends related to wildlife-friendly plants. In addition to increased demand in eco-friendly plant products, participants have noticed other changes among consumers. Participants indicated there was a new generation of gardeners emerging particularly among young, apartment dwellers. These young adults have the capacity to influence the market as they become homeowners and become just as enthusiastic about caring for their yards. Another trend over COVID-19 also emerged, as consumer demographics shifted toward younger fathers purchasing plants to participate in gardening.

Participants shared their perceived barriers and desired benefits to adopting a wildlife-friendly certification for certain plant varieties. Barriers such as cost, production standards, and effectiveness of the program were most common among participants. Participants were interested in the scientifically recognized certification as it would serve as a third-party validation tool coming from a university. They expressed a need for organized communication and marketing channels, a clear message regarding the certification to both growers and consumers, and more

information regarding the specific production standards and cost of the certification. An understanding of these perceived barriers and desired benefits can inform effective strategies designed to maximize adoption (Garbach & Morgan, 2017; McKenzie-Mohr, 2011).

Participants shared that successful adoption of certified wildlife-friendly plants would depend greatly on communication and marketing initiatives. Informing growers and consumers about the ecological and economic benefits of wildlife-friendly plants, certification production standards, and ways to care for the wildlife-friendly plants. They suggested various communication strategies such as rich narratives and digital interactive platforms that allow stakeholders to share information and ideas. Some participants described creating a streamlined branding program that includes social media campaign materials, a website, QR codes, and creative labels. Strategically communicating about the novel certified wildlife-friendly plants can reduce adoption barriers among consumers and growers (Goldberger et al., 2013)

Overall, growing trends toward gardening and wildlife-friendly plants are being noticed by environmental horticulture professionals at all levels within the industry. When it comes to meeting this demand, horticultural professionals are responding in various capacities.

Recommendations

As the University of Florida develops the novel wildlife-friendly plant certification program, researchers must consider appropriate communication resources for growers, consumers, and extension agents/offices. There is a clear role here for agricultural communication and Extension professionals to support this initiative. As with any innovation, it is imperative that industry professionals understand its advantages and how to market to consumers (Goldberger et al., 2013). Communication resources should be tailored for delivery to specific target audiences so the certification program can be clearly defined and understood by various stakeholders. In the interviews, participants mentioned the breadth of the environmental horticulture industry. The certification program should utilize the horticultural industry network to connect larger organizations with local nurseries for support and consistent messaging.

During the interviews, participants also shared that they often find themselves in educational roles with consumers; communicating benefits, care, and other advantages associated with wildlife-friendly plants. The program should develop creative and tailored messages that promote the certified plants while also educating consumers. Therefore, agricultural communication and Extension professionals should work alongside environmental horticulturalists to develop communication materials that support growers and consumers alike. It is also recommended that the certification program considers costs associated with adopting the certification and communicate to growers that consumers are willing to offset costs (pay premiums) for higher quality, environmentally conscious products – such as certified-wildlife friendly plants.

Based on this study, a quantitative survey should be administered to capture the perceptions associated with certified plants among a larger sample of professionals in the environmental horticulture industry. It is also recommended that a quantitative statewide or national survey be administered to gauge consumers' awareness and interest in wildlife-friendly plants and a potential certification. These findings could help develop messaging and branding strategies for the certification program, by exploring what information and support consumers would like to have when it comes to wildlife-friendly plants. Future research should also explore certification labeling and design to optimize grower and consumer interest in the product.

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