

Perceptions of Agricultural Extension and Communication Professionals Regarding Current, Preferred, and Emerging Communication Channels: A Qualitative Study

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Abstract

This study sought to identify what messages are important to share regarding innovations of new turfgrass cultivars, and to determine the current, preferred, and emerging channels of communication as perceived by Extension/Outreach and Communications professionals in ANR for sending information. This study utilized a focus group consisting of turfgrass extension professionals, an interview with communication professionals, and individual semi-structured interviews. From the twelve questions presented through these methods, seven predominant themes emerged. Effectively communicating about turfgrass involves: (1) conveying long-term benefits of the innovations, (2) considering the sender and receiver of turfgrass information, (3) considering the traditional communication channels used for turfgrass, (4) emerging or sought channels for communicating with clientele about turfgrass, (5) barriers to adopting communication channels for disseminating turfgrass information, (6) factors that influence use of communication channels for turfgrass, and (7) who should be disseminating the identified messages. Respondents indicated that though Twitter was the preferred channel of social media communication for those in the turfgrass industry, interpersonal communication and factsheets were still being requested predominately by their clientele. Respondents recommended working with organizations such as city and county municipalities, as well as residential home builder groups, that are likely to adopt innovations, influence behavior change, and create and institute policies, will be essential for dissemination of information. In light of the COVID-19 pandemic and the restrictions associated with it, researchers are depending on emerging communications channels for dissemination of information more so than traditional methods utilized in the past such as field days.

Keywords: communication channels; turfgrass; key player; decision making model; agriculture and natural resources

Introduction

Determining the most effective way to communicate information about an innovation from sender to receiver to create behavior change is the underlying purpose of understanding the interactive process of human communication. Yet to answer that question, considering how the key attributes of an innovation

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can be communicated, how the communication is relevant to the end-user, and how the innovation and its associated information shapes one's opinion is critical (Lamm et. al, 2019; Rogers, 2003; Ruth et. al, 2018).

Review of the literature indicates that the communication channel, the message that is being conveyed, and by whom that message is being delivered, should be considered when developing a communication strategy (Holt et al., 2015; Lamm et al., 2019). Richardson (1989) indicated that determining effective communications in Extension/Outreach has been an ongoing topic of discovery. Decades later, the topic is still being addressed as work by Holt et al. (2015) found that the agricultural message being communicated was just as relevant as the communication channel used. Further, Lamm et al. (2019) concluded that among audience segments in Agriculture and Natural Resources (ANR), there are distinctions in "communication channel preferences" (p. 12).

Turfgrass Innovations, Communication, and Trust

Effectively communicating innovations in the turfgrass industry rests in the need for increased awareness of how advancements in turfgrass breeding and development are accurately associated with positive scientific advancements. Baxter and Schwartz (2018) documented the importance of developing new drought tolerant cultivars of turfgrass as irrigation restrictions are becoming increasingly more common with water becoming a scarcer resource. As new turfgrass cultivars are developed and enter the market, the value of their improvements is often misunderstood, and subsequently misrepresented, thus accurately and effectively communicating their attributes and intended usage needs to be investigated (Schwartz et al., 2020). Seagle and Iverson (2002) found that by the year 2020 the turfgrass industry would undergo significant growth, with emphasis being on best management practices and environmental protections. They also detailed that opinion leaders in the turfgrass industry were best equipped to shape future information related to these turfgrass programs (Seagle & Iverson, 2002).

Whereas, Yue et al. (2017) found that individuals equally trusted turfgrass information received from personal acquaintances, Extension experts, and those employed at home improvement centers, Settle et al. (2017) discovered that there tended to be more trust in agricultural information that originated from non-profit organizations and Extension compared to that communicated by for-profit and governmental organizations. Trusting the source of information and the channel used for communicating information is therefore important for individuals when considering adopting new ANR innovations, including turfgrass.

Theoretical Framework

The Diffusion of Innovations (DoI) (Rogers, 2003) and Elaboration Likelihood Model (ELM) (Petty et al., 2009) were used by Worley et al. (2021) as a framework for investigating the most trusted members among turfgrass strata who could disseminate information regarding new cultivars. Those identified as being trusted in that quantitative data analysis were determined to be "influential individuals of the turf industry, referred to as 'key players,' by professional affiliation" (Worley et al., 2021, p. 86). This was an important pathway of exploration in agricultural communication since who is trusted regarding the sharing of turfgrass innovations information had yet to be analyzed. However, it is still uncertain what communications are being used and why are they being used by key players in the turfgrass industry for disseminating research-based information. Having this knowledge can assist key players in establishing what messages and channels are best for sharing this information going forward. This study utilizes both the ELM and DoI following the Decision-Making Model for ANR Science and Technology (DMM for ANR) developed by Ruth et al. (2018) to describe the current pragmatic processes by which Extension, Outreach, and Communications professionals in ANR are creating and disseminating scientific information.

Diffusion of Innovations

Perception of attributes attached to an innovation is described in Rogers' (2003) Diffusion of Innovations. Rogers (2003) suggested that the perceived attributes of an innovation (relative advantage, compatibility, complexity, trialability, and observability) can have an impact on its adoption (p. 15–16).

“Innovations that are perceived by individuals as having greater relative advantage, compatibility, trialability, and observability and less complexity will be adopted more rapidly than other innovations” (Rogers, 2003, p. 16). Rogers (2003) identifies relative advantage as being “the degree to which an innovation is perceived as being better than the idea it supersedes” (p. 229). The relative advantage can be described in terms such as economic or social benefits (Rogers, 2003). Additionally, demographic attributes, or personal characteristics of the client, can also impact the acceptance and perception of an innovation (Rogers, 2003). The DMM for ANR outlines these attributes stemming from the influence of personal characteristics (Ruth et al., 2018). In the context of the turfgrass industry and this study, understanding the perceptions key players regarding their use of communication channels, in addition to what channels they perceive are desired by clientele, is required.

Elaboration Likelihood Model (ELM)

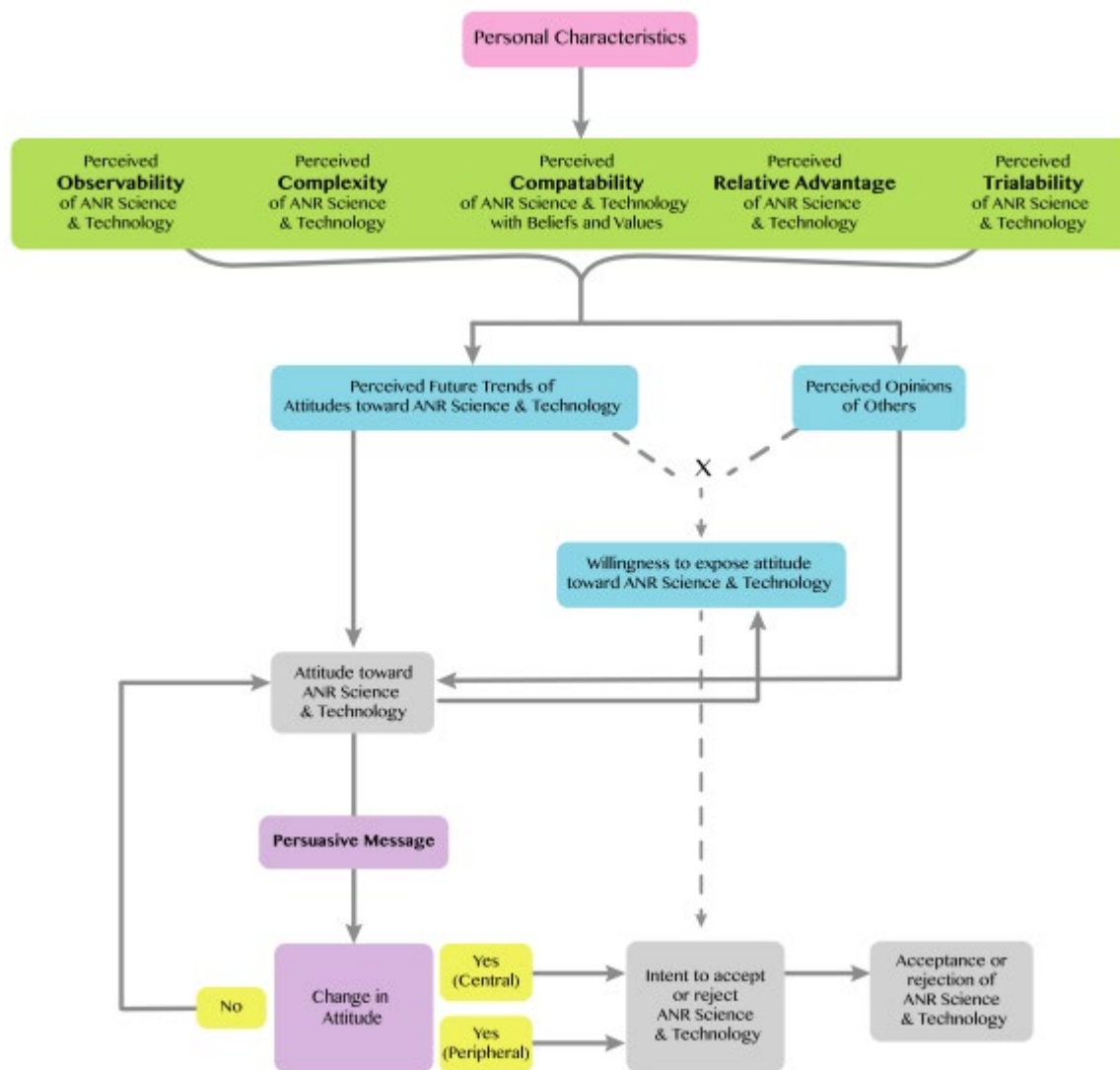
The Elaboration Likelihood Model describes the relevance of information to the client and the processes underlying persuasion (Petty et al., 2009). The manner in which an individual processes information is through either of two routes: the central processing route includes one’s personal interest and motivation to seek and obtain information, whereas the peripheral processing route is influenced by external stimuli that shape one’s inclination for information (Petty et al., 2009). The ELM was included in the DMM for ANR to illustrate how communication can affect attitude change and subsequent behavioral changes (Ruth et al., 2018). It is important to consider how professionals in ANR can effectively influence client perception and adoption by providing information about new turfgrass cultivars in ways complimentary to, and consistent with, end-user reception (Ruth et al., 2018). This study includes the ELM as a way to determine how the framing of messaging and implementation of communication channels are necessary to increase awareness of turfgrass innovations, resulting in attitude and behavior changes that demonstrate adoption and acceptance of these new technologies.

The DMM for ANR Science and Technology (DMM for ANR)

The DMM for ANR Science and Technology (Ruth et al., 2018) was developed as a response to society’s need for factual scientific information to be communicated, as individuals are more likely to only seek information that confirms or supports their current beliefs (p. 225). The fields of agricultural communication, education, and Extension can use the model as a guide to provide educational programs and communications to clientele as a means of limiting the misinformation that is prevalent in today’s culture of duplicitous information sources. The DMM for ANR integrates components of the Theory of Diffusion of Innovations, Theory of the Spiral of Silence, and the Elaboration Likelihood Model (Noelle-Neumann, 1974; Petty et al., 2009; Rogers, 2003). The DMM for ANR displays how these theories of communication combined “guide the dissemination of information about complex ANR issues” (Ruth et al., 2018, p. 225). This model aids the researchers of this study in the development of its application to communicating about turfgrass innovations, through an understanding of messages and channels used to inform decisions.

Figure 1

DMM for ANR



Note: Decision-Making Model for ANR Science and Technology. Reprinted from “A Model for Understanding Decision-Making Related to Agriculture and Natural Resource Science and Technology,” by T.K. Ruth et al., 2018, *Journal of Agricultural Education*, 59(4), 226. Copyright [2018] by Ruth et al. Reprinted with permission.

Purpose/Objectives

While the DMM for ANR has helped researchers to better understand efficient and effective ways for disseminating information about ANR issues, little is known about communications specifically applicable to individual agricultural commodities. Although the DMM for ANR has been applied in previous studies by Harris et al. (2021) and Bode et al. (2021) in the hospitality industry, respectively, as it relates to food safety practices and perceptions of GM foods, this is the first time the model has been applied to an agricultural commodity group; a commodity that is ever evolving due to innovative agricultural advancements. Coupled with Hall & Rhoades’ (2010) study that analyzed Ohio grain farmer’s use of communication channels for accessing information regarding adoption of innovative farming practices to

inform communication methods used by agricultural communicators and Extension practitioners, the foundation was laid for studying communication channel preferences and messaging in other agricultural commodity groups.

Using the application of the DMM for ANR explicitly to the turfgrass industry, the purpose of this study is to determine what should be communicated regarding new turfgrass cultivars and what channels should be used to disseminate those messages to end-users. Understanding the methods currently being used by Extension/Outreach and Communications professionals in ANR will be important in the determination of future communications regarding turfgrass and other agricultural commodities. Therefore, the objectives for this study are:

1. Identify what messages are important to share regarding innovations of new turfgrass cultivars.
2. Determine the current, preferred, and emerging channels of communication as perceived by Agricultural Extension/Outreach and Communications professionals in ANR for disseminating turfgrass information.

The significance of this study lies in determining, and subsequently and potentially modifying, how university researchers and key players across the various strata in the turfgrass industry are communicating with stakeholders about turfgrass. The study provides a better understanding of what messages and communication channels researchers are using and deem important to disseminate information to all clientele in the turfgrass industry. This study has the broader potential to inform how information is most effectively communicated by university researchers to specific commodity groups by analyzing their perceptions of message and communication channel use and importance, leading to the adoption of new innovations.

Methods

The use of focus groups with members comprised from commodity groups has been indicated as beneficial to understand communication channel preferences (Hall & Rhoades, 2010). Ruth et al. (2018) noted that when conducting research on topics such as elaboration, the use of focus groups and interviews with participants that are purposively selected allow for an understanding of the “amount of elaboration people use when presented with ANR information and messages” (p. 232). Moreover, Morgan et al. (2013) note the use of dyadic interviews - those consisting of two individuals responding to questions simultaneously - as being valuable for the purposes of gathering qualitative data in addition to individual interviews and focus groups. Whereas this study is examining creating and disseminating ANR communications from the position of Extension/Outreach and Communications professionals, the use of a focus group, a dyadic interview, and semi-structured interviews allowed these industry professionals to elaborate from their experiences what they determined as being the most impactful messages for dissemination. Additionally, in the context of this study, *end-user* and *clientele* are used interchangeably to mean anyone associated with the turfgrass industry that would be receiving turfgrass communications created by Extension/Outreach and Communications professionals, to include landscapers, turfgrass producers, golf course superintendents, homebuilders, and homeowners.

Focus Group, Dyadic, and Individual Interviews

This qualitative study used data from three main sources: an Extension/Outreach focus group interview, a dyadic interview conducted with two Communications professionals, and individual semi-structured interviews with each participant that took part in aforementioned focus group and dyadic interview. The purposive sample that was selected to participate in the Extension/Outreach focus group were six individuals identified as turfgrass key players in Extension specialist positions (Worley et al., 2021). This served as a focus group for understanding the messaging and communication channels currently being used for disseminating agricultural science information, and those these Extension/Outreach professionals felt were needed for effectively disseminating information regarding new turfgrass cultivars. Extension/Outreach professionals were sent emails that notified them that they had been identified as key players in the turfgrass industry, and invited them to participate as a member of the focus group. As per

Social Exchange Theory, the likelihood an individual will participate in a study is increased when they are aware that their role is valued (Cook et al., 2013). One potential participant was unable to take part in the focus group due to prior commitments; therefore, the lead researcher selected the next key player that had been identified in the Extension stratum. A dyadic interview was then held that included two Communications professionals; one from the public sector and one from the university that was conducting the research. Both the focus group and dyadic interview of the Communications professionals were led by the members of this study's research team: two in the area of Agricultural Education and one in Agricultural Science Communication.

Participants of both the Extension/Outreach focus group and the Communications professionals met via Zoom for one hour and were guided through a set of questions that were predetermined by the researchers and directed by the components of the DMM. Each participant was also emailed the questions following these initial Zoom meetings. Using these questions as a guide, individual semi-structured interviews lasting between 30 and 45 minutes were conducted by the Agricultural Science Communication lead researcher. Leeway was provided for participants to expand on their answers and thoughts. Six individuals from the Extension/Outreach group and the two individuals from the Communications dyad participated in the individual semi-structured interviews. As shown in Table 1, the role and appointment percentage of the participants is indicated. It was important to consider the appointment percentage of participants due to their potential for engagement with communications in Extension/Outreach. Pseudonyms were assigned to members of the focus groups and individual interviews to provide anonymity.

Table 1

Professional role and appointment percentage of participants within focus groups

Pseudonym	Interview Group	Professional Role	Appointment Percentage
Ted	Communications	Multimedia Specialist	*
Bill	Communications	Anchor/Senior Producer	*
Rene	Extension/Outreach	Assistant Professor & Extension Specialist	70 Extension, 30 Research
Sarah	Extension/Outreach	Assistant Professor & Extension Specialist	100 Extension
Hugh	Extension/Outreach	Professor & Extension Specialist	50 Extension, 25 Research, 25 Teaching
John	Extension/Outreach	Associate Professor & Extension Specialist	80 Extension, 20 Teaching
Ben	Extension/Outreach	Professor & Extension Specialist	75 Extension, 25 Research
Don	Extension/Outreach	Professor & Associate Center Director	70 Extension, 30 Research

Note *. Ted and Bill have professional positions where appointment percentage is not applicable.

Data Analysis

Content from each Zoom interview was transcribed verbatim by the lead researcher using Kaltura, a university provided video management and transcription software, in order to perform coded thematic analysis (Lincoln & Guba, 1985). A reflective journal was kept by the lead researcher after the focus group and interviews to refine the interaction with the respondents in the semi-structured interviews. Member checking was used with participants to ensure that the lead researcher was interpreting their answers and comments accurately. No changes were recommended by the participants during the process of member-checking following the focus group, Communications professionals interview, and individual semi-structured interviews. Each researcher on the study team then reviewed the transcripts to provide peer debriefing. The team researchers independently performed content analysis on the transcriptions and compared emergent themes to ensure consistency in interpretation of the data.

From a subjectivity standpoint, the lead researcher previously worked in Extension for almost two decades, making them uniquely positioned to ask probing questions about Extension communication channels and message delivery during the focus group, Communications professionals interview, and individual semi-structured interviews. Currently, the lead researcher is completing a Ph.D. in Agricultural Science Communication and studies and resides in the Southeastern part of the United States. The two team researchers and co-authors have each been working in agricultural and environmental education for nearly 20 years, respectively; one holds an Extension appointment with responsibilities in producing agriculturally-related television segments.

Findings

From the twelve questions that were presented to the focus group, Communications professionals interview, and individual semi-structured interviews, seven predominant themes emerged from the data. Effectively communicating about turfgrass involves: (1) conveying long-term benefits of the innovations, (2) considering the sender and receiver of turfgrass information, (3) considering the traditional communication channels used for turfgrass, (4) emerging or sought channels for communicating with clientele about turfgrass, (5) barriers to adopting communication channels for disseminating turfgrass information, (6) factors that influence use of communication channels for turfgrass, and (7) who should be disseminating the identified messages.

Conveying Long-Term Benefits of the Innovations

Key messages to be conveyed when communicating information about new turfgrass cultivars emerged from the Extension/Outreach focus group and individual interviews with its members. The two messages (presented as sub-themes) that were thought to be important were: (1) Best management practices in caring for new and existing turfgrass, and (2) The environmental and economic benefits of new turfgrass cultivars.

Best Management Practices in Caring for New and Existing Turfgrass

Extension/Outreach respondents provided thoughts around messaging and BMPs for turfgrass. Respondents noted the importance of “after-sales support” and “aftermarket support.” John posed the question for the group as he stated, “have we sort of missed the boat and not provided enough information to allow those managers to manage the existing varieties better?” John goes on to say that messaging around BMPs should include what those practices are when working with landscapers and homebuilders as they are renovating or determining specifications of a new site or landscape, and recognizing that there is hesitancy to replace already existing varieties. Ben shared this need to be proactive with information on BMPs and irrigation practices, as that it comprises a large number of the communications he engages in with clientele. Rene stated, “I think we kind of have recognized some of this work is, in addition to just making people aware of these new varieties, how do we better communicate how to manage them in a way that enhances what they’re being bred to do.” Hugh summarized by adding that the onus for communicating is on the researcher.

Somewhere that we are failing is we are saying that they need to be managed differently, but we don't have a guide for the management of them. And so that's a failing of us because we aren't putting out there that these grasses need to be managed differently when people adopt them. And so, I think that's something we could definitely do to help.

The Environmental and Economic Benefits of New Turfgrass Cultivars

Extension/Outreach respondents detailed how messaging should be communicated to consumers and producers in the turfgrass industry regarding the environmental and economic benefits of new cultivars. Rene commented, "we have several neighborhoods that focus really heavily on environmental stewardship...we do see that they have higher quality turfgrass varieties in those neighborhoods." Ben added the importance of communicating effectively about irrigation systems and how to irrigate as part of the environmental context. John continues by addressing the appropriateness of planting the correct cultivar in the correct environment, and replacing similar vegetation. John stated,

I think you need communication that talks about the problem, the objective, which is, for instance, to use less water, right? But you also as part of that, need to incorporate and integrate an approach which says there are other unique varieties, varieties that do a better job of using less water.

In relation to economic advantage for the turf producers, John remarked that an increase in crop productivity can offset the extra money that is charged to pay royalties. For the consumer audience, Sarah added that messaging should be straightforward so that a client is able to understand the economic and environmental benefits of new turfgrass cultivars using simplified charts, language, and data. Hugh detailed the overall environmental and economic focus of messaging as impacting purchasing decisions based on positive characteristics and attributes of turfgrasses, including the idea that they are not common but innovative, and that in itself carries influence.

Considering the Sender and Receiver of Turfgrass Information

Respondents identified the best communication channels for reaching clientele as print materials, videos, social media, and interpersonal communication. This was analyzed in the context of what the respondents felt were the best channels based on their experience (internal voice), coupled with what they shared from client requests (external voice).

Internal Voice Perceptions of Best Communication Channels

John discussed the effectiveness of publications by saying,

Creating a publication that has enough information but not too much information and doesn't overwhelm those groups is what is the sweet spot. I think we've had some good luck with publications because they look good and people pick them up. But then I've got others that are some of the best I've ever written and I don't think people have read them. It's, I think, it's audience dependent.

Whereas Extension/Outreach professional Don and Communications professionals Ted and Bill noted the use of video and social media as being the best communication channels, Extension/Outreach professionals nearly unanimously stated that Twitter was the preferred channel of social media communications for those in the turfgrass industry. Sarah said, "Twitter is huge for turfgrass." Hugh noted that that individuals and companies in the turfgrass industry "are very heavy Twitter users." Rene stated that she used "Twitter primarily for professional connection engagement." Rene also discussed the value multi-faceted approach using various channels, sharing,

I do think facts sheets are valuable. I mean, I think when you're presenting tangible information on management, I think it's important to have that. I think developing something that all of us can use across our institutions would be a more efficient way of doing that than trying to develop individual things. At least with respect to an overview of what these cultivars look like, maybe not management because that probably needs the more regional. I do think

that social media as a way to target a younger audience, the turf industry is very active on Twitter. I think agent trainings can be effective.

External Voice Perceptions of Best Communication Channels

Although the Extension/Outreach professionals remarked how widely Twitter is used among turfgrass industry professionals, it must be noted that it was said to be the preferred form of social media, not communication channel overall. When asked about external voice, or what communications requests they were still receiving from clients, interpersonal communication and factsheets were steadily mentioned. Ben shared,

There's one message I hear loud and clear every single time, [that] they want me personally, personal communication...As much as our new generation of specialists that we hire are into YouTube and, and do blogs and, and all the new ways of communicating, there is one thing that I hear over and over and that is personal communication and they have to go out and do in-person and I do my training in person.

Ben stated that a fact sheet printed on university letterhead carries a great deal of credibility, weight, and significance. Sarah also stated that she is asked repeatedly for hard copies of print materials and that they are consistently downloaded from their university website.

Considering the Traditional Communication Channels Used for Turfgrass

When participants were asked what communication channels they used to disseminate information, respondents ranged from traditional communication methods to mixed approaches. Extension/Outreach professionals use facts sheets, Extension guides, workshops, face-to-face presentations (including interpersonal communication), field visits, field days, social media, and conferences to share information with clientele. John and Ben stated a preference for traditional face-to-face engagement strategies. Although Ben noted he did engage in social media communication, limited strictly to Twitter, he really put emphasis on "the traditional means [of] how you do outreach and Extension."

Other Extension/Outreach professionals use a variety of communication channels to disseminate turfgrass information. Although Hugh referred to his approaches as being traditional, his use of communication channels was varied, including field days and his university turf website. Don discussed a mixed approach with using more traditional communication channels such as print, coupled with social media. He said, "[I use] written facts sheets, but the impact is low...I'm increasingly using Facebook and Twitter but that impact is only upon those who are following me." Like Don, Sarah shared that her university utilizes a variety of channels.

We are still very traditional in that we, we create documents in short...for folks just to have, especially if it is not really hands-on, kind of a step-by-step guide. On the flip side, we do have videos when we're talking about calibrating fertilizer spreader or calibrating a sprayer. Just things that are easier to show.

Emerging or Sought Channels for Communicating with Clientele About Turfgrass

Respondents also noted channels that were emerging with the rapid growth of technology as well as those sought for future communication with clientele. These included variations of print media, social media, and videos (to be shared via social media). Hugh saw value-added potential in some newer forms of social media such as Instagram. He also brought up the effectiveness of print publications in the form of magazine outlets (including those online) by stating, "And I think those print outlets are still something that's really relevant, that is not tapped into enough when it comes to scientific information." Like Hugh who discussed print media through magazine outlets being a channel with sustained potential, Rene stated in regard to the future use of magazine print media,

But like there's definitely some of these big magazines that are writing on this subject matter. And we need to try to tap into that as much as possible because that taps into a way bigger audience than any of us in Extension. Rene also stated that the use of podcasts was potentially beneficial and added, "In my mind perhaps [the] most important artifacts are those that are designed to facilitate new critical relationships and educate very different groups on what we're doing and why it matters." Sarah and Ben both remarked that as technology continues to advance in society, using videos and social media as communication channels in their programs and Extension overall is going to be vitally important.

Barriers to Adopting Communication Channels for Disseminating Turfgrass Information

Often those disseminating information face challenges resulting in barriers to adopting and implementing new forms of communication. Barriers that were revealed included lack of time due to other responsibilities, lack of knowledge regarding new communication technologies or self-efficacy in producing articles, lack of technology resources including access to communications production experts, and lack of knowledge of clients' preferred communication channels. Regarding engagement Rene stated, "We should spend some time thinking about where we aren't being effective in Extension. We tend to be pretty reactive responding to a particular need for people that know who we are and understand what we do. A pretty large portion of the population is a totally untapped audience that could be really important. I think that if we're really trying to think outside of the box on this grant, we need to identify critical target audiences that are atypical groups that few of us have ever working with. Because that is where the greatest potential lies for this to be different from what we always do."

Ben outlined barriers saying, "Do I have time is probably a major resource I am missing." He continued by remarking, "...sometimes I don't have the technical resources, the technology." Don also stated that time was a barrier in updating artifacts for disseminating information. Lack of financial resources was a barrier for educational program models such as "Train the Trainer" to be instituted for disseminating information, with John noting that it seemed they were all resource limited to hold such programs. Communications professional Ted echoed the cost factor that was associated with printed publications necessary for disseminating requested information.

Factors That Influence use of Communication Channels for Turfgrass

Several factors that influence how communication channels are used by clientele and by professionals disseminating the information were revealed. Maturity, information seeking activity, and peripheral cues were factors of influence. The level of engagement of clients with Extension, and Extension with their client base, had an effect on how information is communicated. Pressure from administrators to keep the status quo was also revealed. Moreover, the COVID-19 pandemic played a role in utilizing traditional or sought channels.

The level of maturity (age) of clientele were revealed as factors of influence in how respondents shared information with clientele, as well as how clientele received communications. Ben explained generational differences in communications usage as seen in his current graduate students who prefer to access information through podcasts and videos. Ted, a Communications professional, shared his experiences with older audiences have shown him that they "still want that physical copy...that physical piece of mail to hold in their hands." Sarah's statement affirmed those of Ben and Ted, adding that a person's location as an additional variable (urban versus rural) could potentially impact their preferences.

When asked about information seeking activity – how individuals seek information, actively or passively, and if this activity is done in a proactive versus reactive manner – respondents stated that scrolling through the internet, whether it be on Instagram or Facebook, an individual can find information passively, yet information could be actively sought by going to a website or YouTube. Rene shared that peripheral cues had an impact on behavior.

Homeowners are primarily influenced by things like what are my neighbors doing? What does their HOA say they can do? And so unless you're appealing to those things in some way, if you're just talking to one person, the impact that it gives is immediately restricted. So, tapping into groups like HOAs is tapping into groups that influence homeowner behaviors.

Expectations from administration as to what artifacts should be created for the dissemination of information was a factor in which channels respondents used for communication. It was stated that by several respondents that administrators often want traditional print publications, thus Extension/Outreach professionals continue to primarily produce these forms of communications "to keep administrators happy."

The COVID-19 pandemic was an additional factor in the dissemination of turfgrass information. Extension/Outreach professionals had to modify the ways they had previously engaged with clients, resulting in lasting impacts on program delivery methods and use of communication channels. Don, who traditionally met face-to-face with numerous clients and presented educational programs stated,

COVID has really impacted. In 2019, I traveled a total of 111 nights on the road, most in state. And last year, I was on the road five nights... Things have shifted and I'm not sure we'll ever go back... It's been a shift in the utilization of technology. And then that begs the question, is there going to be a shift utilizing technology from this point forward?

Who Should be Disseminating the Identified Messages

When asked who should be depicted as being trusted in communication artifacts such as video media, respondents noted that public figures that people trust were most effective for disseminating information regarding new turfgrass cultivars. Also, Extension agents and Extension volunteers, namely Master Gardeners, were identified as those who should be delivering the messages. John remarked, "...your Master Gardener groups and your county agents...your county agents are really in touch and are humble." Sharing John's sentiment, Don stated, "...Master Gardeners are generally more in the know, as opposed to just the general population." He followed with, "Our Master Gardeners serve as the front-line defense."

There were conflicting responses among several Extension/Outreach professionals regarding scientists as being seen as trusted to deliver messaging. Ben shared that "the expert scientists, the University Extension Specialists" are those that should be trusted, and therefore disseminating information regarding new turfgrass cultivars, yet John remarked, "not your turf breeder" and "not a scientist."

As noted in earlier, a university's involvement with the information being disseminated provides credibility. Sarah pointed out that connecting with clients and building trust can be more easily accomplished if there is already some sort of rapport with the source. "Any kind of connection that they feel that they have with a certain university or certain outlet is probably going to lead them to believe them more." Also, selecting influential members in the community or ones that are prevalent in media was thought to be effective in message dissemination. However, it was reiterated that these visible figures should be partnering with the universities and research institutions to deliver research-based information; otherwise the propagation of misinformation and pseudo-science will undermine any efforts scientists are making with agricultural innovations. Don, Rene, and Sarah all mentioned popular garden experts in their respective areas that are influential in disseminating ANR information. Rene subsequently noted,

There's so much diversity in what people trust. I think we have seen that more than ever in this past year. Frankly, I think that the expert in each video should be catered in some ways to reflect the communication channel and the target audience. While the key players on this grant are who they are, there may be others that can endorse or promote what we are doing that carry more weight in the eyes of select end-user groups than we would alone.

Conclusions

This study sought to identify what messages are important to share concerning innovations of new turfgrass cultivars, and to determine the current, preferred, and emerging channels of communication as perceived by Extension/Outreach and Communications professionals in ANR for disseminating information. The researchers analyzed the current communication channels being used by Extension/Outreach and Communications professionals in the agricultural industry when providing information to clientele, what channels Extension/Outreach and Communications professionals felt needed to be used for dissemination information about turfgrass innovations, and what messages they felt were most important when communicating about these new turfgrass cultivars. Seven predominant themes were identified when effectively communicating about turfgrass innovations.

The DMM for ANR, developed to “break the cycle of decisions made with incomplete information and equip practitioners with the foundation needed to efficiently and effectively disseminate information through educational practice and informed communication efforts,” supports the information shared by the respondents (Ruth, 2018, p. 224). As per the DMM for ANR (Ruth et al., 2018), which outlines Rogers (2003) stages of persuasion, delivering research-based information of new turfgrass cultivars, as recommended by the respondents, leading to change in knowledge and behavior is imperative for adoption of the innovation.

Diffusion of Innovations

The culture of Extension in each state was found to play a role in the channel used to disseminate information to clientele. Rogers (2003) describes internal characteristics of organizational structure that contribute to “innovativeness of organizations” (p. 411). These variables can have a positive or negative influence on an organization’s innovativeness. Due to these variables, the methods used to disseminate messages in the agricultural community, coupled with the channels used, differed among Extension/Outreach professionals.

Formalization is “the degree to which an organization emphasizes its members’ following rules and procedures” (Rogers, 2003, p. 412). The rigidity with which an organization establishes parameters to guide behavior can result in an impediment to innovation. It was communicated in the interviews that some Extension/Outreach Specialists developed the types of communications they did often due to following standard requests set forth by administration within their universities. Respondents also indicated contributing factors as well as barriers to communication included lack of resources available in the university for creating and disturbing information, to include time and money. Administrative expectations were eluded to have a containing impact on the creativity specialists could demonstrate and employ for communicating information.

Interconnectedness describes how the exchange and flow of ideas occurs within interpersonal networks (Rogers, 2003). Respondents indicated that working together to develop messages centered around a common innovation would be an effective strategy for disseminating information. Jordan et al. (2021) state the need for agricultural scientists to participate in “politics of constructive collective action” with coordinated social and technical approaches as innovations are ever emerging (p. 24). With consistent combined communication efforts, visibility of the innovation and associated agricultural commodity industry increases, illustrating the significance of scientific research, and thereby leading to more opportunities for public engagement and potential trust of the scientific community.

Size is a variable that is measurable and often associated with a relational increase or decrease in innovativeness. In relation to size, communications use differed among Extension/Outreach Specialists due to the varying population and environmental features of the states in which they reside and work. States with a smaller population, as indicated by the Specialists, used different methods for communication including more interpersonal and face-to-face methods due to their accessibility to clientele. While size is

a determinant for using specific communication channels, it cannot be necessarily independently equated with innovation adoption (Mlecnik, 2013; Rogers, 2003).

Elaboration Likelihood Model

The Elaboration Likelihood Model (Petty et al., 2009) intersects with the DoI in the DMM for ANR by demonstrating how relevant information being communicated through various channels can influence processing, affecting changes in attitude and behavior. Attitudes that are changed via the central route do involve cognitive work, yet it is not indicative that they are ingrained in an accurate manner; these thoughts are often based on prior knowledge and experiences. However, these attitudes can be changed in how person processes the message that is being received, including variables such as how trustworthy they view the source of the information. “In sum, attitudes changed via the central route tend to be based on active thought processes resulting in a well-integrated cognitive structure, but attitudes changed via the peripheral route are based on more passive acceptance or rejection of simple cues and have a less well-articulated foundation” (Petty et al., 2009, p. 135). Differentiation was found in the channels and messages for dissemination of turfgrass innovations between Extension/Outreach Specialists and Communications professionals due to their perceptions of effective communication following the routes of elaboration, as situated in their university positionality and self-efficacy.

Both Extension/Outreach and Communications professionals responded that there were two primary messages that influence behavior change (both following the central processing route) that should be conveyed to clientele regarding knowledge acquisition and relative advantage of new turfgrass innovations. Respondents expressed a need for their clientele to understand best management practices for existing and future implementation of turfgrass. This “how-to knowledge” is important because if an innovation is adopted without such information, “rejection and discontinuance are likely to result” (Rogers, 2003, p. 173). Further, they recommended sharing information about the economic benefits of utilizing turfgrasses that are drought tolerant, which would relay “principles-knowledge” to end-users that involve “functioning principles underlying how an innovation works” (Rogers, 2003, p. 173).

The messages that were conveyed were ones that respondents in the Extension/Outreach focus group found of particular necessity due to their experience working with irrigation, turfgrass implementation, and turfgrass innovations, as well as from client interactions. These respondents noted that traditional outreach and engagement communications, such as factsheets, were developed to create behavior change from the context of the messages shared, thus following a central route, yet noted that failing to use emerging communication channels neglects the tremendous influence of peripheral cues.

However, Communications professionals recommended the use of mass media communications such as videos on social media to disseminate new information about turfgrass, and remarked that adoption of these cultivars could be driven by personal opinions, social perceptions, and peripheral cues. These professionals felt that perceptions of adopting turfgrass could be linked to one’s attitude about sports; being perceived as an early adopter of a new cultivar was associated with status and increased significance in a community, especially if the cultivar is linked to something that holds a popular place in society, such as the Super Bowl or the Master’s golf tournament.

Recommendations

Recommendations for Practice

Practical application of the findings is intended as the researchers proceed with their engagement in the multi-state USDA/SCRI grant. Testing recommended messages and communication channels will occur as researchers continue to discover how audience segmentation within the turfgrass industry garners the need for diversity in communications. The researchers are using social and mass media channels for dissemination of information to convey the recommended messages. The researchers have created a website to house information that can be shared across the institutions involved in the grant. Further, as

recommended by several of the respondents, working with organizations such as city and county municipalities, as well as residential home builder groups, that are likely to adopt innovations, influence behavior change, and create and institute policies, is essential for dissemination of information. In light of the COVID-19 pandemic and the restrictions associated with it, researchers are dependent on emerging communications channels for dissemination of information more so than traditional methods used by the specialists such as field days. Although not generalizable, these findings suggest that those working in turfgrass-related fields may wish to further explore the use of emerging education methods such as multi-media and social media communication channels for disseminating information.

Using both the DoI and ELM, as found in the DMM for ANR, the current and intended processes by which Extension/Outreach and Communications professionals in the turfgrass industry are creating and disseminating scientific information were revealed. The findings from this study will aid future turfgrass experts in more effectively communicating with and assisting stakeholders in receiving research-based information regarding industry innovations. While the DoI will steer how researchers develop and determine messaging and communication channels to address end-user perceptions of turfgrass innovation, the ELM will guide turfgrass innovation acceptance through the use of these determined communications. Additionally, results of this study can help refine the DMM for ANR, specifically for turfgrass professionals, to use in their industry.

Recommendations for Future Research

Due to the nature of the traditional role of the Extension specialist on campus in comparison to the agents in the field, further research should be conducted to determine if therein lies a distinction between the creator and the communicator of turfgrass information. Whereas Extension agents require research-based information to disseminate in clientele interactions, programs, and activities, future research should analyze the role of the turfgrass researcher in this relationship; a determination should be made as to whether the turfgrass researcher should strictly be creating knowledge, and the role of the agents and other Extension personnel at the county level is to share it through channels determined appropriate for their clientele, or if the responsibility for creation and dissemination lies within both roles.

Loizzo et al. (2019) analyzed the use of Twitter among ANR scientists and found that although some universities are asking their researchers to create a more online presence for public engagement, some scientists were reticent to use the social media tool due to similar barriers encountered in this study, including “lack of recognition for public online engagement efforts in the tenure and promotion process” (p. 16). Therefore, exploring the promotion and tenure evaluation criteria used with specialists to determine if revisions may be needed to move beyond fact sheet-type channels of communication, potentially with a peer review process being implemented for media-related communications such as videos, is recommended.

Although participants were asked if they thought information was being sought by clientele in an active or passive manner, a distinction needs to be made in future research as to the behavior of those end-users in seeking and obtaining information of new turfgrass cultivars as it relates to the communication channel. A determination needs to be made from future data collection and analysis to see if newer forms of communications, such as social media, are being used for gathering information and increasing awareness in a passive manner, active manner, or combination, as opposed to sources such as white papers, fact sheets, websites, and field days being used in a traditionally active manner.

Further, addressing the assumption that simply educating the end-user leads to behavior change needs to occur. Though this study was using the DMM for ANR to test the means by which behavior change may occur utilizing communications for increasing knowledge, it needs to be further understood how the process of educating the end-user to increase knowledge alone does not equal behavior change, without accounting for multiple variables. Therefore, further research utilizing the ELM primarily as part of the

DMM for ANR understanding variables affecting the two routes to persuasion, beyond those associated with source factors such as trustworthiness, to adopting turfgrass innovations is needed.

Whereas this study focused on current preferences and intentions for the dissemination of ANR information in the turfgrass industry, future audience segmentation research on the association between communication channel preference for receiving messages in relation to demographics of turfgrass industry end-users is necessary. Because other factors fall within the domains of a change in attitude and behavior, future research is planned to analyze contextual variables among end-users in the turfgrass industry to determine if a correlation exists between variables such as age and location, and how that relationship influences communication preferences.

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