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Forest Health Diagnostics Facebook Page: Impact and Natural Resources Programming Implications

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Abstract

The Southern Forest and Tree Health Diagnostics Facebook page, managed by Extension and forestry professionals in the southeastern United States, is designed to deliver forest and tree heath information to the public via a web-based, crowdsourced diagnostic service. We conducted an online survey to quantify the page's impact by identifying audience demographics, engagement levels, and perceptions of the page's value. Results indicated that stakeholders consider the Southern Forest and Tree Health Diagnostics page to be an effective diagnostics service and a valuable educational tool. This model could be used in other natural resources program areas to increase the reach of Extension professionals.

Keywords: Cooperative Extension, forest health, outreach, social media

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Introduction

Extension forestry programs are the leading providers of landowner education in the United States (Jones, Glover, Finley, Jacobson, & Reed, 2001; Kueper, Sagor, Blinn, & Becker, 2013). As climate change and a global economy lead to increases in pest-related issues in forests and trees, demand for forest and tree health education has risen from a diverse base of stakeholders in commercial, private, urban, and rural environments (Gusto, Diaz, Carton de Grammont, Coyle, & Silvert, 2020). As Extension professionals, we must consider the

shifting ecological and social demographics of these stakeholders and their properties to best serve our clientele. Land management practices have been affected by the increasing proportion of wildland–urban interface land use (Radeloff et al., 2018), and a younger audience is emerging in our professional spheres (Bogdanou, Starr, Weatherall, & Leslie, 2013; Sagor, Kueper, Blinn, & Becker, 2014). To best serve this rapidly changing audience, it is important to adapt to our stakeholders' evolving preferences for information tools and be creative in our use of technology and different modes of communication (Milburn, Mulley, & Kline, 2010).

An examination of the census of Extension forestry program leaders in 2013 showed an increased use of digital communication tools since 2008 (Sagor et al., 2014). Accessing the Internet is now easier and more affordable than ever before with advancements in mobile phone technology and a wide range of freely available social media platforms. Facebook is the primary platform used by Americans; 69% of adults in the United States report that they are Facebook users, and roughly three quarters of those users access Facebook daily (Perrin & Anderson, 2019). Facebook's tools and features allow for an immediate exchange of images and information, free of cost, that can be accessed anywhere. For these reasons, Facebook has expanded from the solely commercial and social sphere and become a widespread and valuable educational and professional tool (Ali, 2016; Shaw, 2017).

Purpose and Objectives

We conducted a study to determine the feasibility and potential of using a social media platform (Facebook) as an online diagnostic tool within a natural resources Extension program and to examine the reach and impact of the resulting Facebook page. Our objectives were to measure (a) the public's level of engagement with the site and (b) the site users' perceptions of its value.

Methods

To evaluate the utility of Facebook as an educational tool for use in forest and tree health Extension, we established the Southern Forest and Tree Health Diagnostics Facebook group and associated page (hereafter referred to as the SFTHD FB page) in 2017 (https://www.facebook.com/groups/SouthernTreeHealthDiagnostics/). This group, open to anyone with a Facebook account, is managed by Extension, forestry, entomology, and tree health professionals in the southeastern United States and serves as a forum within which people can exchange information and present questions to the specialists who manage the page. Group members submit their forest and tree health questions and pictures. Then via the collective knowledge of the community, they receive diagnoses and management solutions or are directed to more appropriate resources. Community responses are monitored and curated by the professionals who manage the page to ensure accuracy. Crowdsourcing for identification purposes is not a novel concept on Facebook, and there are several popular identification pages in the field of natural resources on this platform. A page called "Tree Identification" hosts over 38,000 members with the purpose of "tree identification and discussion specifically about identification characteristics" (https://www.facebook.com/groups/treeid/). Other identification pages such as two titled "Plant Identification and Discussion" (https://www.facebook.com/groups/623997204362467/) and "Insect Identification" (https://www.facebook.com/groups/Insect.Identification/) have hundreds of thousands of combined members and encourage experts from their member bases to facilitate discussion during the identification process.

The SFTHD FB page uniquely provides identification, diagnostics, and management solutions to the public

using crowdsourced expertise to address tree health issues remotely. For Extension educators, remote diagnostics saves time and money by removing the need for a personal site visit. Use of the SFTHD FB page as a remote diagnostics tool reflects these savings, as it was relatively inexpensive to create and market (less than $3,000 in person-hours) when compared to the cost of individual site visits. However, it is far more difficult to measure impact when using social media as a learning tool. Therefore, we used an online survey (SurveyMonkey) to quantify the impact of the page by identifying the demographics of our audience members, their engagement with the site, and the extent to which they value the site for diagnosing issues related to forest and tree health.

We obtained data by posting a short SurveyMonkey questionnaire on the Facebook page in spring 2018. When the survey was administered, the diagnostics page had 433 members. All members of the page had access to the survey, and two reminders were posted. A total of 66 usable responses were obtained, making the overall response rate 15%. Although low response rates are expected in web surveys compared to other survey methods (Yan & Fan, 2010), the method we used was the only way to reach page users as we did not have access to their addresses. Some participantschose to skip questions, and percentages were calculated on the number of usable responses collected per question. To supplement the survey data, we consulted Facebook Insights for current information on user age and gender demographics at the time this article was completed (March 2020). Unfortunately, Facebook Insights data for the time the survey was distributed were not available due to a programming error, according to a representative from Facebook's help center.

The survey questions are shown in Table 1. We asked a series of nominal, ordinal, interval, and ratio scale questions and conducted descriptive statistical analyses of the survey responses (i.e., calculated percentages) to understand how people engage with and value the diagnostics site. For the ordinal scale questions, we calculated a weighted average to determine how most participants responded. For open-ended questions, the survey instrument included fields that allowed participants to write in and elaborate on their responses. This option fostered improved accuracy in our reporting of the public's experience when using the site as a diagnostic tool. Finally, we summarized survey responses to identify strengths and weaknesses in communication and identification strategies, which will help the moderators of the Facebook page reach a wider audience and increase efficiency in providing forest and tree health diagnostics.

Table 1.

Questions Administered in Southern Forest and Tree Health Diagnostics Facebook Page Impact Survey

Question #	Question
1	Do you find the Southern Forest and Tree Health Diagnostics Facebook page valuable?
2	How regularly do you look at posts on this page?
3	How many times did you post in the last month?
4	How many times have you commented on posts in the last month?
5	If the diagnostics page saved you time (e.g., if you did not need to look something up on your own or wait for someone else to diagnose the issue), what would you estimate the time savings to be?
6	Has the diagnostics page saved you money?
7	Has the diagnostics page helped you learn more about forestry? Become a more active educator?
8	What is your profession?
9	How much land do you manage?
10	What is your age?

Note. Questions involved scaled, multiple choice, and open-ended responses.

Results

Participant Demographics

A variety of occupations were represented by the survey participants (Table 2), and some respondents worked in multiple fields. The most common professions were consultants, state employees, Extension agents, and educators. At the time the survey was distributed, the ages of participants were normally distributed, with a range of less than 21 to over 70 years. Nearly half (43.9%) were between the ages of 31 and 45 (Table 2). Half of the survey participantssaid they did not manage any land at all, but nearly a quarter reported managing over 500 ac of forested land (Table 2).

Table 2.

Demographics of Participants in Southern Forest and Tree Health Diagnostics Facebook Page Impact Survey

Variable	Percentage of total responses
Profession (72 responses)[a]	
Consultant	22.2
State employee	18.1
Extension agent	12.5
Educator	11.1

Student	8.3
Arborist	5.6
Master gardener	5.6
Landowner	4.2
Contractor	2.8
Nonprofit representative	2.8
Retired person	2.8
Nursery worker	1.4
Rancher	1.4
Age (65 responses)	
Under 21	1.5
21–25	4.6
26–30	6.1
31–35	12.1
36–40	15.2
41–45	16.7
46–50	9.1
51–55	9.1
56–60	9.1
61–65	9.1
66–70	6.1
Over 70	1.5
Acres managed (66 responses)	
0	50.0
Less than 10	12.1
11–50	9.1
51–100	1.5
101–500	6.1
More than 500	21.2

aSome participants gave multiple answers when asked to identify their profession. A total of 65 people responded with 72 entries. To give an accurate representation of our audience, we based percentages on the number of entries, not people.

Data accessed via Facebook's Group Insights feature on March 19, 2020, indicated that 44.6% of the page's users are female and 55.2% are male; 0.2% of users did not disclose their gender. These data also indicated

that over half of group members (51.5%) are between the ages of 25 and 44 (Table 3).

Table 3.

Age and Gender Data for Southern Forest and Tree
Health Diagnostics Facebook Page Users as of March
19, 2020

Age	Female %	Male %	Undisclosed %	Total %
18–24	1.4	2.6	0.0	4.0
25–34	8.9	15.9	0.2	25.0
35–44	12.2	14.3	0.0	26.5
45–54	8.3	9.4	0.0	17.7
55–64	9.0	7.2	0.0	16.2
65+	4.9	5.7	0.0	10.6

Note. Data accessed via Facebook Group Insights
feature, available to administrators of the Southern
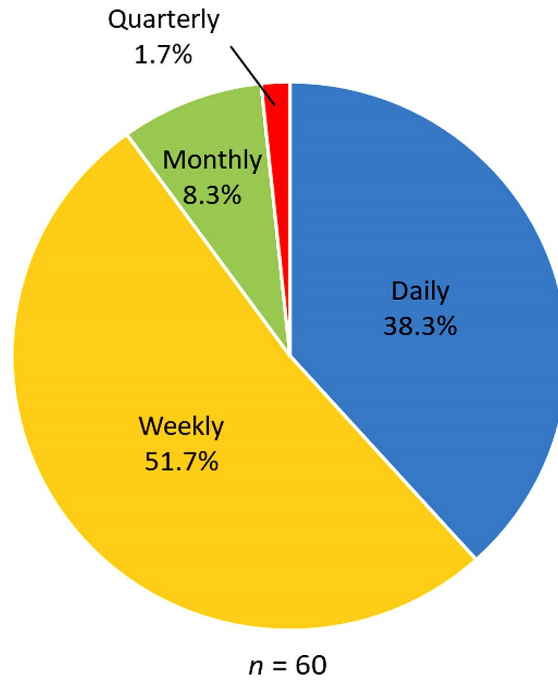Forest and Tree Health Diagnostics Facebook page.

Participant Engagement

Many people visited the site to observe and learn, but not interact. The vast majority of members who participated regularly looked at the page, but few actively commented or posted. Nearly all of the participants (90.0%) looked at the page daily or weekly, and one participant viewed the page only quarterly (Figure 1). Most participants had not posted anything in the month preceding the survey, and only three people had posted six times or more in the same time period (Figure 2). Similarly, most people (90.9%) did not reguarly comment on posts (Figure 3).
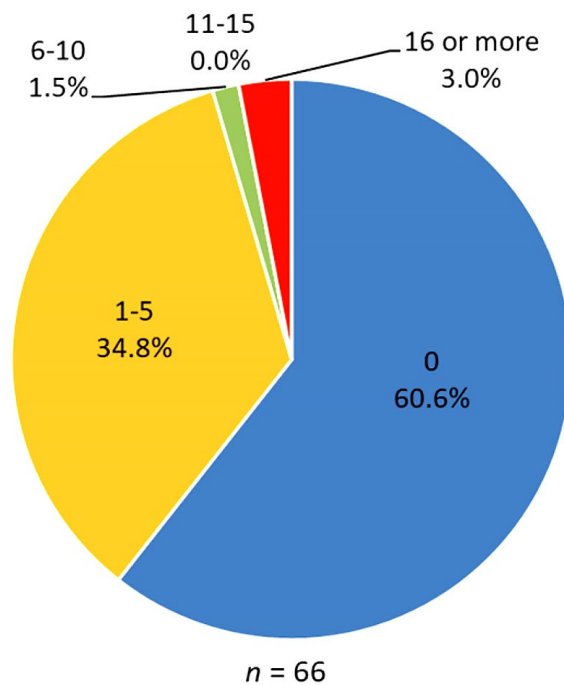
Figure 1.

Level of Engagement on Southern Forest and Tree Health Diagnostics Facebook Page Based on How Regularly Participants Visit Site Annually

n = 60

Note. Categories represent percentages of total responses.

Figure 2.

Level of Engagement on Southern Forest and Tree Health Diagnostics Facebook Page Based on Number of Times Participants Posted in Month Survey Was Distributed

n = 66

Note. Categories represent percentages of total responses.

Figure 3.

Level of Engagement on Southern Forest and Tree Health Diagnostics Facebook Page
Based on Number of Times Participants Commented on Posts in Month Survey Was Distributed

n = 66
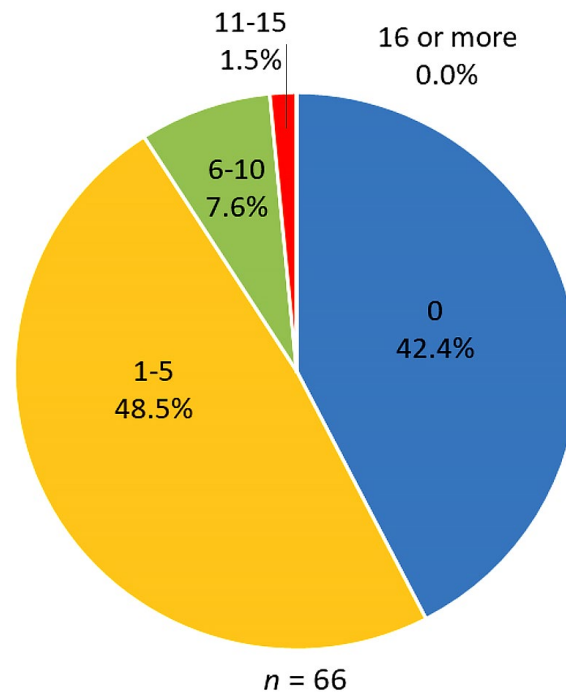
Note. Categories represent percentages of total responses.

Perceived Value of Page

Participants valued the diagnostics page, as the average value rating was 4.2 out of 5 on a scale of 0 (*not valuable at all*) to 5 (*extremely valuable*). All respondents found the page at least moderately valuable, and most participants (83.1%) rated it as "very" or "extremely" valuable. One individual stated, "As a student in forestry, this page is an extremely valuable tool and resource for learning about the pests, pathogens, and diseases which affect our trees." Another said, "As an arborist, it assists me when identifying pests and tree problems for my customers." These comments suggest that the diagnostics page is useful to people in all career stages and in a variety of professional fields.

Participants were asked to indicate whether the SFTHD FB page saved them time using a scale of "Did not save me any time" to "Saved me a huge amount of time" (Table 4). If the participants expressed that they had experienced time savings, they were asked to estimate the total number of hours saved since becoming members of the SFTHD FB page. Most participants (77.1%) agreed that the site had saved them at least "some time" in their daily lives. Many reported that the site had saved them 1–10 hr since becoming members, and several people credited the site as having saved them 1–3 hr of work for each issue related to forest and tree health. When asked to elaborate, participants reported saving the most time relative to research when trying to diagnose and manage specific issues. Overall, the data showed that the diagnostics page had saved participants at least an hour of their time since joining. Because the SFTHD FB page had 433 members when the survey was taken (and 1,314 members as of May 8, 2020), we can assume that this equates to significant time savings.

Monetary savings to participants could be defined by salary for time spent, travel costs, consultation fees, costs of unnecessary or ineffective treatments, or any other form of expenditure required in diagnosing forest and tree health issues and prescribing management solutions. Most participants (51.6%) agreed that the diagnostics page had saved them at least "a little money" (Table 4). One respondent reported having saved over $10,000 as a result of information from the page. Others said they had experienced savings of $500 to $1,000. Many said it had saved them $1 to $100, and one individual reported having saved $25 per post.

Table 4.

Amounts of Time and Money Participants Estimated Having Saved Through Use of Southern Forest and Tree Health Diagnostics Facebook Page

Category	Did not save me any	Saved me a little	Save me some	Saved me a lot	Saved me a huge amount	Total responses	Weighted average
Time	8.2%	14.8%	36.1%	29.5%	11.5%	61	3.2
Money	48.4%	22.6%	22.6%	3.2%	3.2%	62	1.9

Note. Percentages are of total responses to question.

Participants found the site to have great educational potential. Majorities found that it improved their skills as educators or consultants (67.7%) and helped them better answer client/customer questions (52.3%) (Figure 4). When given the opportunity to describe other ways the diagnostics page had helped them learn about forest health, individuals reported using the material they learned from the diagnostics site in their master gardener classes, interactions with landowners, and professional lives. One person even credited the site with inspiring pursuit of "advanced training in tree pathology." These enthusiastic responses and the quantitative survey data suggest that people consider the SFTHD FB page a valuable educational tool.

Figure 4.

Responses from Participants When Asked "Has the Southern Forest and Tree Health Diagnostics Facebook Page . . ."

Note. Figure shows percentage of total responses to each question.

Conclusion, Implications, and Recommendations

New forest pests and diseases are being introduced to the southeastern United States at an increasing rate (Seebens et al., 2017), and native ones continue to affect current and new places (Dodds et al., 2018). The growing number of threats to forest and tree health means a higher demand for educational outlets for

delivering new knowledge and skills to stakeholders. Extension educators are the primary link between specialists and landowners, and they facilitate the promotion of sustainable forest and tree management (Gusto et al., 2020).

The reach of landowner education efforts can be expanded through the use of social media as a learning tool. Facebook offers unique advantages as a distance learning tool and allows for flexibility in learning time, reduction in travel and associated costs, and opportunity for participants to communicate with others without geographic limitations (Lippert, Plank, Camberato, & Chastain, 1998).

The SFTHD FB page applies the distance learning format to a forest and tree health education program to deliver information to the public through a web-based diagnostic service. A larger group of individuals can be reached at a lower cost, increasing the level of engagement between educators and the public. Distance learning platforms are especially appropriate for forestry professionals based in rural locations and allow for networking opportunities to occur that otherwise would have been impossible with limited access. Additionally, the general public can gain remote access to a professional instantly, broadening the exchange of new information in forest health. Because of these advantages, it is possible that the SFTHD FB page will economize existing programs by lessening duplicity of efforts across multiple Extension specialists in different states (Bogdanou et al., 2013).

Since the group's creation in 2017, feedback has indicated that the site is an effective tool for exchanging forest health information and identifying tree health issues remotely. However, the degree to which the platform has generated an audience that was previously weakly connected to existing Cooperative Extension forestry programs is still unknown. Additionally, the study was limited by a low survey response rate. Because of this, the consistency and degree to which the aforementioned trends hold true for all 1,221 members remains unknown. More research and member feedback are needed to help the site's managers make the site more effective as an educational and diagnostic tool in the forest health sector. We measured the public's level of engagement with the site, the site's perceived value among its users, and the impact experienced by participants. Users were moderately to highly engaged with the platform, perceived financial value in the site, and felt an impact through knowledge gained and acreage managed. The results indicated that the SFTHD FB page is an effective diagnostics service and an accessible means of promoting communication between forestry professionals and the public without temporal, financial, or geographic limitations.

Although our study focused on the SFTHD FB page, some principles and observations are broadly applicable to web-based educational platforms in natural resources in general:

- The demographic variability of the participants indicated that the diagnostics page has a wide potential for reach and is useful to people in all career stages and in a variety of professional fields. This page could be used as a model for an outreach component of a larger Extension program, and the general framework could be applied to different regions or different focus areas.

- Over half of our respondents were between the ages of 25 and 44, and nearly 70% were between the ages of 25 and 54. Although there were slightly more male than female respondents, the proportions were nearly equal. Assuming that our respondents were representative of the SFTHD FB page as a whole, this information suggests that online components of Extension programs could be particularly effective for reaching young and middle-aged professionals.

- Most people do not wish to comment or post frequently. The majority of participants visit the site to read and learn and do not feel compelled to publicly interact with the community—and this is fine. Any dialogue among site users and managers is a success, as the site provides a unique opportunity for users to communicate and exchange ideas across a broad geographic range with a diverse pool of professionals to which they would not ordinarily have access.

- Determining time and monetary savings (i.e., the value) of an online educational tool such as the one we used is difficult. But survey participants believed the site was quite valuable and, in some cases, had saved them thousands of dollars. Measurable output was particularly high in this case, because the site was inexpensive to create and maintain.

- Participants valued the diagnostics site for its educational potential. Participants reported that the material they learned from the diagnostics site encouraged them to seek advanced training/more education in forest health, helped improve the health of trees in their communities, provided professional dialogue on pest problems and their solutions (including tree removal suggestions in at least one case), and increased engagement through partnerships with other professionals. People seemed to benefit from having accurate forest health information aggregated in one location, as researching topics through peer-reviewed articles can be a time-consuming and contradictory process. These responses and data suggest that people consider the SFTHD FB page a valuable educational tool. This model of a web-based, crowdsourced learning tool can also be used in other natural resources program areas to deliver information to a wide audience at a low cost.

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