

The Backyard Citrus Grower and their Level of Knowledge: What Extension can do to Communicate about Citrus Greening

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Introduction

The citrus greening disease causes citrus fruit to remain in the immature green fruit stage, drop prematurely from the tree, and have a bitter taste (UF/IFAS Citrus Extension, 2018). The Asian citrus psyllid is the known cause of spreading the citrus greening disease and first arrived in the U.S. in August 2005, infecting trees in south Florida first (UF/IFAS Citrus Extension, n.d.). Since then, the disease has spread across numerous states (USDA, n.d.) and has been detected in all three of the major citrus producing states of Florida, California, and Texas (USDA, 2017; USDA, n.d.). Since the 2004-2005 growing season, orange juice prices have increased by \$2.29 per to a 2016-17 price of \$6.71/gallon (Morris, n. d.). Although consumers in the citrus-producing states are experiencing impacts of the disease through increased orange juice prices, they are unaware that citrus greening is affecting their state's overall economy (Ruth, Beattie, Lamm & Rumble, 2017). Many of these same residents are growing citrus trees in their backyards. Sixty percent of homeowners in California are growing citrus residentially (Grafton-Cardwell, Daugherty, Jetter, & Johnson, n.d.). However, they are unaware that their home citrus trees are a potential host for the citrus greening disease and are promoting disease spread (Bayer, 2016). The purpose of this study was to determine if consumers' level of knowledge and concern about the citrus greening disease is different among the citrus-producing states. With a better understanding of residents' knowledge about citrus greening and its impact, plans to include them in disease containment and prevention can be more strategically developed for improved effectiveness. This study aims to contribute to literature addressing Research Priority 6: Vibrant, Resilient Communities of the American Association of Agricultural Education (AAAE) National Research Agenda (Graham, Arnold, & Jayaratne, 2016).

Theoretical Framework

The diffusion of innovations theory guided this study (Rogers, 2003), providing a structure to explain how people in social systems do not adopt idea simultaneously but rather at different points in time (Rogers, 2003). In order for people to adopt these ideas, they must first be introduced to the idea and then the idea needs to gain traction throughout the social system for it to be recognized or adopted (Rogers, 2003). In the scope of this study, there is a need for educational programs to introduce the idea of citrus greening to the local community and for the idea of residential citrus growing best management practices to gain traction in communities throughout the consumer citrus areas.

Methods

A non-probability, opt-in sampling technique was used to distribute an online survey to consumers in the major citrus producing states of Florida, California, and Texas (Baker et al., 2013). The survey was disseminated using Qualtrics, an online survey company. The survey generated 1,541 usable responses, yielding a 59.9% usable response rate. The data were weighted based on the 2010 U.S. Census data for each state to increase the generalizability of this study to the general population (Baker et al., 2013). This study was part of a larger study that aimed to understand public perceptions of genetic modification and citrus. The survey questions were researcher-developed and reviewed by a panel of experts. Five multiple choice questions were asked to determine consumers' knowledge of the citrus greening disease. The five knowledge questions asked about tree symptoms, how the disease was spread, where the disease originated, the tree parts that are impacted, and the states infected by the disease. Chi-square tests were used to compare the three states' correct answers to the five knowledge questions.

Consumers were also asked to indicate their feelings towards the citrus greening disease using a five-point semantic differential scale. The four polar opposite statements used to determine consumers' feelings about citrus greening are *I am very concerned about the citrus greening disease/I am not at all concerned about the citrus greening disease*, *citrus greening disease directly affects me/citrus greening disease does not directly affect me*, *I am bothered by citrus greening disease/I am not bothered by citrus greening disease*, and *I care a great deal about finding a cure for citrus greening disease/I do not care at all about finding a cure for citrus greening disease*. An index was created to reflect consumers' perceived attitude of citrus greening. The index was found to be reliable ($\alpha = .86$). An ANOVA test was run to determine if there were differences between states in their attitude of citrus greening.

Results

The chi square test indicated a significant difference ($X^2 (2) = 14.3, p = .001$) for the question referring to *how the citrus greening disease was spread*. However, the data did not suggest there was a significant difference for the remaining questions. The ANOVA indicated there was a significant difference in the mean index score among the different states of residence ($p = .01$). Table 1 indicates the mean composite index score for Florida respondents was significantly greater than the composite opinion index for California and Texas.

Table 1

Attitude of Citrus Greening of Residents in Citrus Producing States

State	<i>n</i>	<i>M</i>	<i>SD</i>
California	525	3.24	.95
Texas	501	3.24	.95
Florida	520	3.40	.97

Conclusion/ Recommendations

When asked specific questions about citrus and citrus greening, of the five questions in total, only one question, pertaining to how the disease was spread, showed significance. This indicated a couple of things. There is a relationship between individuals in citrus producing states and knowledge of how citrus greening disease is spread, but individuals are not well informed about other aspects of the disease. Educational programs about citrus greening, such as those provided through the Cooperative Extension Service, could address multiple aspects of the disease, what it means for not only citrus growers but also individuals with citrus trees, as well as possible solutions to the problem. Florida residents seemed to be the most concerned about the impact of citrus greening as they have experienced citrus greening for the longest period of time compared to the other citrus producing states (Bove, 2006). Given the large amount of backyard citrus in these states, and the difference in levels of knowledge across the citrus producing states pertaining to aspects of the citrus greening disease, it is vital to help residents know how to prevent and protect against the spread of the disease. According to Rogers' (2003) diffusion of innovations theory, people must be aware of the idea before adoption of the innovation can begin. The results of this study suggest that backyard citrus growers must first become aware and knowledgeable about the citrus greening disease before they can begin adopting practices that will positively impact the citrus industry.

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