A Multi-State Qualitative Exploration of Citrus Growers' Experiences with Huanglongbing and Their Perceptions of Management Strategies

Introduction

The United States (U.S.) has experienced a substantial decline in citrus production, with a 72% reduction in fruit used for juice and a 20% decrease for fresh consumption. This downturn resulted in significant economic losses for the citrus industry, particularly in Florida (Hodges & Spreen, 2012; Luckstead & Devadoss, 2021). Since 2005, Florida's orange production dropped by 90%, the number of citrus growers declined by 62%, and juice processing facilities declined by 66% (Munch, 2023). Huanglongbing disease (HLB), also known as citrus greening, is often cited as one of the primary reasons for the changing landscape of the citrus industry. While there has been a significant focus on developing preventive and management strategies for HLB, understanding growers' experiences before and after HLB, their perceptions of management solutions, and the information they receive to support their decisions has been given less attention. Therefore, this qualitative study was designed to explore the impacts of HLB on citrus operations in Florida and Texas, as well as the experiences and perceptions of citrus growers regarding management solutions and information related to HLB.

Theoretical framework

This study is guided by the theory of the Diffusion of Innovations (DOI) (Rogers, 2003). Preventive and management strategies are conceptualized as innovations. As outlined in the theory of Diffusion of Innovation (DOI), growers' perceptions are important determinants that drive innovation adoption and precede decision-making in the innovation adoption process (Rogers, 2003). As adoption is an uncertainty reduction process, understanding how growers have experienced HLB and what management solutions they have adopted and innovated will further our understanding of coping with HLB and guide future research and Extension activities.

Methodology

We followed a generalized qualitative research approach, as described by Yin (2016), to capture the individual grower's lived experiences and uncover the depth of knowledge about HLB management and its impacts. To understand the experience and perception of citrus growers, an interview guide was developed with 10 open-ended questions based on a literature review. An expert panel reviewed the interview guide to ensure content validity, and it was pilot tested with Extension professionals to ensure face validity. Based on the learnings and feedback from the pilot test, the instrument was revised. The Institutional Review Board approved the revised guide and protocol for this study at the University of Florida. Five participants were recruited from central citrus-growing states, using a convenience and snowball sampling approach. Data was collected through an hour-long interview via Zoom. The interview transcript was transcribed using Otter.AI. Researchers then validated the transcript for accuracy. The data were imported into NVivo (Lumivero, version 14) for coding and theme development (Harding, 2013). Codes and themes were developed inductively via descriptive coding (Harding, 2013).

Findings

Impacts on citrus operation

Growers reported that growing citrus was a lucrative business before HLB, as the cost of production was less and there were no significant concerns related to pests. Following the onset of HLB, growers reported extensive impacts on their operations, including increased costs, rapid

fruit drop, and a decline in profit margins. Growers reported a trickling effect of such loss on their personal lives and mental health. Growers reported selling off citrus land, shifting to other crops, and leaving it fallow. After HLB, growers reported increased use of fertilizers to maintain the vigor of trees and help fight disease, reliance on chemical pesticide sprays every month or so, and the use of antibiotics, among other things.

Growers' perceptions of management strategies

Growers reported that no single management strategy was sufficient to combat HLB. They employed a range of management practices, including horticultural management, pathogen management, insect management, and adjustments to tree nutritional programs, to maintain tree vigor and production. Growers reported that spraying chemical insecticides and pulling out the trees were ineffective and unsustainable. While growers reported that the CUPS (citrus under protective screen) structure was expensive, they called it a good preventative strategy. Growers reported using protective bags or covers to shield young trees from infection and applying antibiotics when the trees are growing outdoors. However, they questioned the sustainability of antibiotics. Growers believe that genetically engineered resistance rootstocks, which are tolerant to diseases, would be the ultimate hope.

"*I am very excited with the work that Julia is doing now with the CRISPR, you know, working with the university to get this. I think he's got the Carrizo rootstock, that is, that he's budded some, I think he's got flushes, which shows good promise. I truly, you know, if I were going to plant a tree today, that's what I would be doing, is putting buds on those to his CRISPR root. Ultimately, I think, that's our ranch. I mean, we cannot, you know, the OTC is a therapy that can be done for the next 10, maybe 15 years, I don't know but drilling holes in your tree all the time like that, that's not a good thing. So, we need this tolerance."*

Call for a stronger relationship and need-based research

All growers reported the University Extension, peers, the United States Department of Agriculture (USDA), and the citrus growers' association as the primary source of information. While they receive information from these diverse sources, their decision and action to try out a management solution or practice depend considerably upon feedback received from peers about those new management options. While growers valued Extension and its role, they emphasized that Extension professionals develop long-standing relationships with the grower community. Growers also emphasized the importance of connecting the university's research with growers' needs to better serve the land-grant mission.

Conclusions and Implications

HLB significantly impacted citrus operations, as it substantially altered horticultural management, pathogen management, insect management, and the nutritional program for trees. Over the years, growers have learned to live with the disease, sustain their businesses, and advocate for it. While growers expressed frustration dealing with HLB, they still hold hope in genetically engineered tolerant rootstock to revive citrus production. Insights obtained from this study are crucial, as they communicate citrus growers' experiences with HLB and their perceptions of management solutions and information sources to a wide range of stakeholders, including the USDA, commodity associations, university Extension, and researchers. Findings also advance understanding of growers' practical challenges about the adoption of various management strategies.

References

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