Knowledge and current practices related to agriculture water microbial quality among Kansas and Missouri produce growers

Yeqi Zhao[1], Don Stoeckel [2], Manreet Bhullar[1], Londa Nwadike[3,4]

[1]Department of Horticulture and Natural Resources, Kansas State University [2]California Department of Food and Agriculture [3]Kansas State Research and Extension, Kansas State University [4]University of Missouri Extension, University of Missouri

Introduction

Fresh produce is one of the most common vehicles for foodborne pathogens. In fact, from 2009 to 2018, there were 753 foodborne disease outbreaks associated with leafy greens alone in the United States, resulting in 15,603 illnesses, 1,604 hospitalizations, and 151 deaths. In several of these outbreaks, contaminated water was implicated as the source of contamination. Therefore, the US FDA implemented the FSMA Produce Safety Rule (PSR) which requires agriculture water management practices to reduce the prevalence and transmission of pathogens in agriculture water and thus in produce.

Kansas State University and University of Missouri Extension educators conducted a survey to gather information to better help Kansas and Missouri growers to comply with the water requirements of the PSR.

Objectives

1. Understanding the current knowledge and practices of Kansas and Missouri produce growers related to agricultural water microbial quality.
2. Determining future extension outputs and activities needed to improve the practices of produce growers related to water quality.

Methods

The survey was developed by Kansas and Missouri extension personnel. Due to COVID-19, the survey was primarily only administered online by using Qualtrics XM. Kansas and Missouri produce growers were asked to complete the survey through email listservs and when attending on-line training sessions.

This survey includes 14 multiple choice (some can select more than one answer) and short answer questions intended to discern the growers' knowledge of agriculture water usage for production and postharvest purposes, and their understanding of microbial water quality.

Results

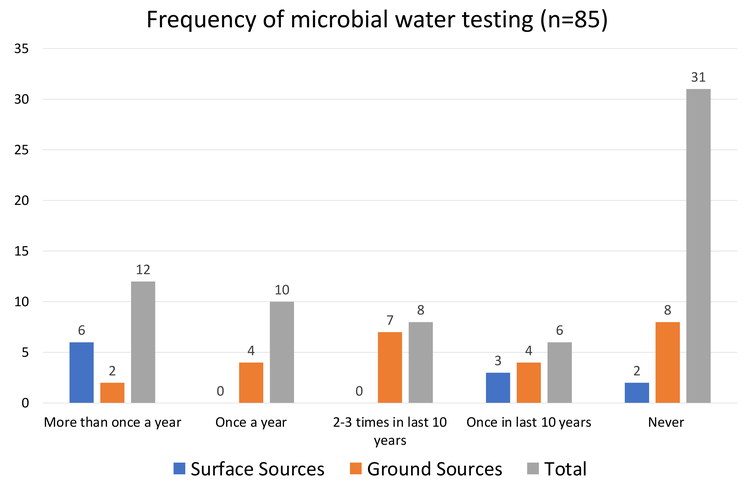

Figure 1: Comparing the frequency of microbial water testing used for postharvest activities between surface water sources and ground water sources. Municipal water data is not included in the graph.

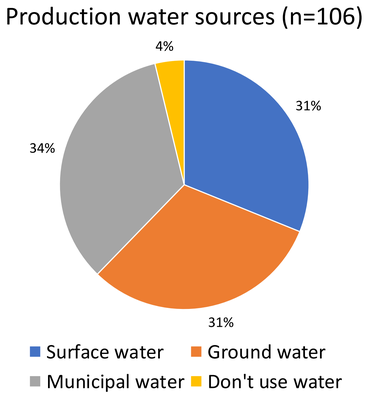

Figure 2: Number of water sources growers use for production activities.

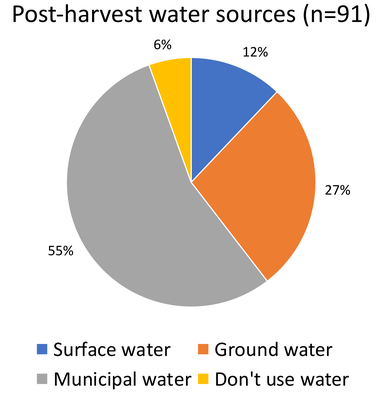

Figure 3: Number of water sources growers use for postharvest activities.

Question	Surface water		Ground water		Municipal water	
	Yes	No	Yes	No	Yes	No
Do you treat production water?	12	21	4	29	7	29
Do you treat postharvest water?	7	4	7	17	7	42

Figure 4: Treatment application status for each water source growers used for production and postharvest activities.

Discussion

- Figure 1 shows that the majority of respondents using surface or ground water (n=36) have tested the microbial water quality at least once. However, universal testing and greater frequency of testing can help farms take corrective actions that reduce risk to fresh produce from inadequate water quality.
- When comparing the water sources used for production and postharvest purpose (Figure 2 and Figure 3), the percentage of growers using municipal water increased from 34% (n=36) to 56% (n=50), and surface water decreased from 31% (n=33) to 12% (n=11). This shows more growers understand the importance of using a reliable and clean water source for post-harvest activities.
- Figure 4 shows that four respondents use untreated agricultural water from surface water sources in postharvest activities. This underscores the urgent need to bring training opportunities to these growers because this practice is inconsistent with both Good Agricultural Practices and the PSR as currently written.

Future Implications

- Future trainings should increase their emphasis on the importance of microbial quality of water sources, and how different water sources should be handled appropriately.
- Growers should be continuously encouraged to get their agricultural water tested to ensure microbial quality.

Acknowledgements

The project is generously funded by a United States Department of Agriculture National Institute of Food and Agriculture Food Safety Outreach Program Grant (FSOP FY19 - 2019-04239).