BY PETER KONJOIAN AND BETH SCHECKELHOFF

Adding Edible Crops to an Ornamentals Operation: Food Safety is a Different Ball Game

Peter Konjoian is president of Konjoian's Horticulture Education Services Inc. His career spans four decades as a commercial grower, researcher and consultant. Beth Scheckelhoff is Extension educator at Ohio State University.

Today's guest is Beth Scheckelhoff, Extension educator at the Ohio State University in Ottawa, Ohio. Beth received her undergraduate degree at the University of Arkansas, Fayetteville, in 1997. After graduating, she interned at Green Circle Growers in Oberlin, Ohio, before pursuing graduate school at Michigan State University with Royal Heins and Arthur Cameron. Beth graduated in 2005 with her master's and doctorate degrees in floriculture production and took her current position at Ohio State. She continues to work with agronomic, ornamental and specialty crop producers across Ohio as an Extension educator.

Peter: Thank you for joining me for this important topic, Beth. Today's discussion will focus on food safety from the perspective of traditional ornamental crop growers who are considering or have already shifted part of their ranges to edible crops.

Regardless of the crop category, ornamental or edible, crop production is crop production. After all, a geranium doesn't know that it's not going to be eaten and a tomato doesn't know that it is. Growers seem to be fine with tweaking their crop culture responsibilities, but the added layer of food safety management is new to many of them. How are you seeing this shift toward edible crops unfolding?

Beth: Certainly, there has been great interest from ornamental growers across the country to explore edibles and the opportunities they present. In Ohio, like most other areas, communities have expressed a desire to know how and where their food is being produced — and who is growing it! Many greenhouse operations have been able to capitalize on this consumer shift by meeting demand for year-round locally grown produce, especially with leafy greens, tomatoes, cucumbers, herbs and some other specialty items.

Interestingly, many greenhouse businesses that now grow ornamental plants actually began growing vegetable plants. They produced either transplants for field production of "truck crops" such as celery, cabbage, carrots, tomatoes, etc. that were then trucked to local or distant markets or for growing finished product in the greenhouse for consumption. In many ways, some of these businesses have come full circle with renewed interested in growing edible crops once again.

Peter: Beth, that comment allows me and many fellow growers of my generation to flash back to our childhoods. I grew up on precisely the family truck farm you describe with vivid, wonderful memories from grade school of accompanying my father in the farm pickup truck into Boston to deliver our produce to the wholesale market. Today's bustling Faneuil Hall Marketplace, a popular tourist destination and city meeting place, served as that wholesale market up to 1970. Whenever I'm in the area and pass by what used to be the stall we'd unload at … I'm 10 years old sitting next to my dad in the truck.

Back then, my experience with food safety meant dumping the morning's cucumber harvest into a large tub of water to remove field soil before hand packing into wooden bushels. Our tomatoes were run through a machine with rolling brushes to remove debris and polish off pesticide residues. Recalling these practices makes me shudder at our naiveté.

You hit the nail on the head as well about family truck farms shifting to flowers and bedding plants during the 60s and 70s to generate more profit. Our current interest in switching back to edible crops, for the same reason, is indeed a closing of the circle for growers and the reason my research re-focus carries the title "from flowers to food."

Beth: You are absolutely correct. The general principles of growing plants apply to vegetables and ornamentals, though the systems can be widely different. Technology and automation have been instrumental in developing many year-round production systems for vegetables in greenhouses and enclosed spaces. Think LED lights and hydroponic NFT systems.

Peter: Explain how growers should focus on food safety concerns in the production (greenhouse) environment compared to the post production (storing, packing, shipping) environment. Same principles, different practices?

Beth: Growing edible crops does force growers to think a bit differently about their product. When growing ornamentals, we have to focus on cleanliness and sanitation from a plant pathogen standpoint — we don't want to spread germs that might get other plants sick. With edibles, we certainly want to be aware of plant pathogens but we also have to be aware of pathogens that can cause human

illness as well. Some of the more common culprits are Salmonella, Campylobacter, Listeria, Norovirus, and E. Coli. These can be spread through human contact.

First and foremost, the goal of any greenhouse operation should be to prevent pathogens that cause human illness from coming into contact with any edible items grown, harvested and packed in their facilities. Once human pathogens contaminate fruits, vegetables, and herbs, they are nearly impossible to eliminate. Thus, growers need to focus on implementing good agricultural practices (you may know these as GAPs) that help reduce the risk of contamination — during production, harvest, packing, storage and shipping of product.

Several key elements of GAPs are to ensure that workers follow proper health and hygiene practices as well as add cleaning and sanitation practices throughout the entire process from start to finish.

Peter: Ornamental crop growers who maintain clean growing operations already understand the value of good agricultural practices. It's interesting how your description of GAPs aligns perfectly with Worker Protection Standards where worker health and hygiene are also the concern. Different objectives achieved by the same practices.

On a list of sayings that I've built over my career is do what's best for the plant. It has guided me as a commercial grower to not cut corners and make decisions that favor what's best for the crop. It also serves me as a researcher in that well controlled experiments generate more reliable data than sloppily executed studies.

I like your explanation of an ornamental crop grower needing to focus on plant pathogens while an edible crop grower must do that and also address the human pathogen layer. Your comment reinforces the ounce-of-prevention-pound-of-cure approach used in managing plant pests. What extra precautions will growers need to take to address the human pathogen category?

Beth: It's helpful for any grower to have a good understanding of basic GAPs used in the production of fruits, vegetables, herbs and other edibles. Many GAPs are geared toward outdoor production and in soil, but the principles also apply to greenhouse-grown crops. Controlled environments allow us to eliminate some of the risks we might encounter if growing outdoors, but it does not eliminate them all.

Cornell University houses the Produce Safety Alliance, a cooperative effort between Cornell, USDA and FDA to provide federally mandated education and resources according to the

Food Safety Modernization Act, also known as FSMA. FSMA was passed several years ago and requires growers of "covered produce items" — generally items that are consumed raw — to participate in seven hours of produce safety education. The training resources, dates, and lots of other useful pieces of information can be found at producesafetyalliance.cornell.edu.

Each state's Cooperative Extension Service, Department of Agriculture and other entities work together to deliver the trainings to growers. In Ohio, for example, Extension offers GAPs workshops while the Department of Agriculture coordinates state-wide FSMA trainings with educators co-teaching workshops.

Peter: Good to know, Beth. Growers of ornamental crops will acquire their GAP education via the same traditional entities that deliver crop production education. I've heard you talk about types of certification growers can earn. Are there different levels or grades of food safety or is it an all or nothing qualification?

Several key elements of GAPs are to ensure that workers follow proper health and hygiene practices as well as add cleaning and sanitation practices throughout the entire process from start to finish.

Beth: Food safety certification is generally market driven. Growers pursue the certification process if and when their buyer(s) require it. Generally speaking, wholesale buyers tend to require certification, whereas farmers markets may not. In some instances, completion of a GAPs training may suffice the buyer's requirements for food safety training.

There are varying levels of food safety certification as well as organizations and certifying bodies that provide services to growers. Many growers look to the USDA GAPs certification process, and the newer Group GAPs program that allows more than one grower to combine efforts and reduce costs in the certification process. More info on these can be found here: www.ams.usda.gov/services/auditing/gap-ghp.

Peter: Let's finish with pros and cons of greenhouse and indoor controlled environment edible crop production compared to traditional outdoor field production from the food safety angle. Tell us more from your perspective as a food safety expert.

Beth: Greenhouse production vs. outdoor production — Greenhouse growers are generally not dealing with native soils or the application of manure amendments. They also experience a reduced number of animal intrusion events, though they can still happen. Coverings also minimize overhead splashing of water on soil surface which can spread pathogens on produce surfaces (Figure 1). Higher quality water is often required in hydroponic systems which eliminates the use of surface water sources that are open to the environment and can harbor pathogens.

What is the same — both greenhouse and outdoor production must focus on personal hygiene practices among employees and workers. Employees are the first line of defense in recognizing potential food safety hazards and reporting them to the proper individuals. Educating employees on GAPs is key to providing a safe product.

Peter: Concluding, food safety responsibilities are, in a sense, a different ball game for growers of ornamental crops looking to diversify into edible crops. However, learning good agricultural practices will take place via the same traditional university extension programs and departments of agriculture they have received training from in the past. gpn

Figure 1. Controlled environment bell pepper production. Greenhouse and vertical farm environments eliminate native soil contamination, domesticated animal activity, and outdoor weather events.