



The Importance of Water Quality for Food Safety

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Food safety has become an important issue to consumers and is reported on frequently by national media. From 1990 to 2005, there were 713 documented produce-related foodborne illness outbreaks in the United States. Food safety has become a major initiative of the US government. Now, major retail food chains are requiring third party food safety audits of the producer and packinghouse before buying produce from a company. One of the criteria of food safety audits is the safety of the water that is used to irrigate produce or wash produce for packing. Issues relating to producers meeting food safety audit standards and state mandatory food safety standards when required and the water permitting constraints that the state Water Management Districts impose will be discussed as well as public opinion on food safety and water issues.

Growers, whether ornamental or agricultural producers, are concerned with the availability and quality of the water they use on their crops. Due to the rapid growth in Florida, growers are being asked by their water districts to use surface water resources for crop production water needs. This is to help conserve ground water for the needs of Florida's increasing population. The use of surface water for crop production has two possible drawbacks for the producer. One is the possibility for plant pathogens, such as *Pythium*, *Phytophthora*, and *Ralstonia*, to be in the surface water. When the contaminated water source is used on a susceptible crop, devastating crop loss can occur. The other drawback is the potential for the water to contain waterborne food pathogens. Ornamental growers are not usually concerned with waterborne food pathogens but in recent times, as their business has declined, some ornamental operations have started producing fruits and vegetables. Also some are producing more finished or "value added" fruit or vegetable plants for the consumer that come with mature edible produce on the plant. These growers then need to be concerned that the produce on the plant the buyer takes home is not contaminated with a waterborne food pathogen.

Food safety has become a national issue for food production. In the past few years there have been several large foodborne illness outbreaks in this country. The outbreaks have been well documented by the media. Major grocery store chains require fruit and vegetable businesses to provide documentation that third party food safety audits done by an independent company have been successfully completed both on the packinghouse and the farm where the produce is grown. The federal government documents foodborne illness outbreaks and is involved with the trace back procedures to determine the cause of the outbreak. In 2008 there was a large foodborne illness outbreak and tomatoes were at first implicated. It was later found to be serrano peppers grown in another country but severe economic damage was done to the Florida tomato industry. Also, the leafy greens industry has had several outbreaks in the last few years. Both industries have adopted mandatory food safety programs for producers and packinghouses. There have been significant increases in

the number of foodborne illness attributed to produce in this country. Outbreaks have doubled from 1973–87 and 1988–1998 (Schneider, 2010). There are 76 million cases a year of foodborne illness with 325,000 being hospitalized (Schneider, 2010). The economic cost is projected to be up to \$152 billion every year in a new study for the Produce Safety Project entitled "Health-Related Costs from Foodborne Illness in the United States" that was released in early 2010 (Finan, 2010). In a talk by Dr. Keith Schneider of the University of Florida Food Science Department given earlier this year, the real cost is the 5,200 deaths each year from foodborne illness.

In Good Agricultural Practices (GAPs), water is considered to be one of the most important areas to manage to ensure food safety. In this article irrigation water will be the focus. The two sources for irrigation water are wells and surface water. In food safety programs well water should always be tested at least once a year but generally deep wells are considered to be free of waterborne food pathogens. For food safety issues we will focus on surface water sources. There are many waterborne pathogens. These waterborne pathogens can be a bacteria, protozoa, or virus. Table 1 lists the types of waterborne pathogens. Also a comprehensive list can be found in the Bad Bug Book at the FDA website: <http://www.fda.gov/Food/FoodSafety/FoodborneIllness/FoodborneIllnessFoodbornePathogensNaturalToxins/BadBug-Book/default.htm>. GAPs focus on water that comes into contact with the produce or any surface that will touch the product. In the Florida Tomato Best Practices Manual it says that any water that touches the plant at the time of harvest should meet the standards for potable water. In a talk by Dr. Renee Goodrich-Schneider of UF Food Science Dept., the Association of Food and Drug Officials (AFDO) Model Code for Produce was given. This code recommends that any water that contacts the mature crop should meet the microbial standards for drinking water or be treated to meet those standards (Goodrich-Schneider, 2010). If a grower is able to use well water in Florida then he can reasonably meet these criteria. For growers who must use surface water this can pose a problem. Some growers do not have the volume of water from wells that is needed for their crop or are mandated by their water district to use surface water to conserve ground water. Also surface water is an attractant to wildlife which can be carriers

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Table1. Types of waterborne pathogens.

Bacterial pathogen	Protozoan pathogen	Viral pathogen
Toxigenic <i>Escherica coli</i>	<i>Cryptosporidium parvum</i>	Hepatitis A
<i>Shigella</i>	<i>Giardia lamblia</i>	Rotavirus
<i>Vibrio</i>	<i>Cyclospora cayatensis</i>	Enterovirus group
<i>Salmonella</i>	<i>Microsporidium</i> spp.	Adenovirus
<i>Campylobacter</i>		Retrovirus
<i>Helicobacter</i>		Norwalk or Norovirus
<i>Aeromonas</i>		

From a PowerPoint presentation by Dr. Keith Schneider, University of Florida Food Science Dept.

of these waterborne pathogens. Wildlife in your growing area puts the grower in more “food safety jeopardy” and can cause a grower to fail a third party food safety audit.

Surface water use has several issues for growers using it for irrigation. For food safety issues, surface water is generally considered safe to use through drip irrigation or for seep irrigation if there is no splashing. It is the use of overhead irrigation with surface water that is the big concern for food safety. This could be overhead sprinkler irrigation for watering or for cold protection in frost/freeze events. Some of the issues with the use of surface water for irrigation are: cost to the grower of increased water testing fees as surface water sources need to be tested quarterly; for drip irrigation there is the added cost of filtration of organic matter to keep the drip tape or emitters from getting clogged by particulate matter and even for overhead irrigation the water may need to be filtered to keep sprinkler heads from plugging; and the cost of treating the water with chemicals such as chlorine or hydrogen peroxide products to be sure the water meets microbial water standards.

What should a grower do to be sure the water used for the crop is safe? Well water is the safest water source to use if the water will come in contact with the crop. If you must use surface water, limit its use to drip irrigation where it will not come into contact with the plant. If surface water is used for overhead irrigation, be sure to have water microbial tests done regularly.

To be safe, try to avoid using surface water overhead on crops that are not washed before reaching the consumer. If you must use it, treat the water so that it is in the “safe to use” range of microbial standards. A grower should take advantage of the cost share programs that some water districts have to help with the cost of adding tail water recovery ponds that will be needed to meet the water district’s mandate for agriculture to reduce the use of ground water. Currently some of the water districts pay for the filtration systems and are trying to add in cost share funds for the equipment needed to treat the water to meet microbial standards.

Producers of any fruit or vegetable crop need to be sure the water source that contacts the edible part of the plant does not contain waterborne pathogens to insure the food safety of the product they deliver to the consumer.

Literature Cited

- Finan, Colin. 2010. Foodborne illness costs U.S. \$152 billion annually, landmark report estimates. Pew Charitable Trusts website: <http://www.pewtrusts.org/news_room_detail.aspx?id=57596>.
- Goodrich-Schneider, Renee. 2010. Talk given 25 May 2010. Food Safety Workshop, Gainesville, FL.
- Schneider, Keith. 2010. Talk given 25 May 2010. Food Safety Workshop, Gainesville, FL.