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Irrigation

Planning for Irrigation with Produce Safety In Mind

Irrigating with surface water or water from compromised wells or distribution systems can be a source of contamination for your produce through the introduction of bacteria, viruses, or parasites. These pathogens are typically found in the feces of people and animals, both domestic and wild. The principles below apply to irrigation as well as other types of pre-harvest water applications such as frost protection and pesticide or fertilizer application.

Irrigation Systems

The risk of crop contamination varies with the type of irrigation and water source. Systems that minimize irrigation water contact with the edible portion of the crop reduce the risk of contamination. Aim to deliver irrigation water directly to the soil surface near plant roots.

Drip Irrigation is ideal for reducing irrigation risk as there is no or minimal contact between the irrigation water and the edible portion of the plant. Drip irrigation requires some investment in infrastructure, but has the advantages of water efficiency and reduction of plant pathogens, such as molds and mildews. Drip irrigation under plastic (pictured above) further minimizes contact between water and produce and is a good choice for fruit that rests on the ground (e.g., strawberries) or when irrigation water quality is suboptimal.



Overhead irrigation from surface water increases the risk for produce contamination as the irrigation water is in contact with the above-ground portions of the plant. Water is lost to evaporation and some plant diseases are promoted due to wet leaves. If using overhead irrigation, irrigate early in the day to reduce water loss due to evaporation and allow leaves and fruit to dry throughout the day, reducing the survivability of both plant and human pathogens. Try to time irrigation so that there is as much of a gap as possible between irrigating and harvesting to reduce pathogens.

Reducing the Risk of Irrigation Water Contamination of Produce

- Do not irrigate with surface water immediately after storm events, when bacterial loads from run-off are generally higher.
- To prevent cross contamination of potable water with non-potable water, install backflow prevention devices where appropriate and make sure there are no cross connections between potable and non-potable water supplies. Backflow devices prevent water with additives (e.g., fertilizer or pesticides) from contaminating the water source (e.g., well, municipal or surface water).

Water Testing

Test irrigation water for *E. coli* according to the following schedule by water source:

Municipal or Public Systems—Water testing may not be required, although the most recent water quality report is required for GAPs audits. Consider testing at the outflow for both *E. coli* and total coliforms if the farm distribution system is old, recently modified, or potentially compromised. Water quality may be significantly different after water comes through miles of pipe to be used on the edible portion of a crop than it was at the municipal or public system. There could be breaks in the water lines before or on the farm that could impact water quality.

Wells and Springs—Test water once per year, preferably at the beginning of the season so corrective actions can be taken, if necessary. Well water that is used for drinking and hand or crop washing should be tested for generic *E. coli* and total coliforms to be sure that it is potable.

Surface Waters (lakes, ponds, streams, rivers) — Test at least three times per year, at the start of the season, at peak use, and prior to harvest. For early and short season crops such as spinach, test at least one water sample within a few days of harvest. Three samples should be tested for later season crops and crops planted in succession. [**Note: Different testing frequencies may be applicable under the Food Safety Modernization Act or for particular certifications and/or buyers**]

Microbial levels can vary greatly in surface waters, depending on the season, upstream activity, weather, presence of wildlife including annual migrations, and water turbidity and flow. Keep all water testing records; over time you will be able to determine the average water quality for your surface water and will be able to recognize variations from your baseline. Your local watershed committee may be able to help you determine factors that can affect the quality of your surface water.

Results

Irrigation waters should not exceed 235 MPN or CFU / 100 ml for *E. coli*. Above this threshold, mitigation practices are necessary. Contact the Produce Safety Outreach Coordinator at UVM Extension to discuss your situation.

Mitigation Practices

- When using overhead irrigation, and first setting it up in the field, it is best to flush the lines to clean out any debris or critters that accumulated in line when not in use. Leave the end caps off to do this.
- Retest irrigation waters under different conditions (e.g., under dry conditions) to determine if the reading is an anomaly or if the levels are consistently high over time.
- Maximize the drying time between overhead irrigation and harvest to reduce the survivability of both human and plant pathogens (such as *Phytophthora sp.*) Irrigate in the mornings so plant tissues can dry.
- Periodically check and maintain water pumps and filters for any foreign items. Tape off inlet and outlet ends when not in use or storing for winter to prevent animal nesting.
- If possible, (especially for higher risk crops such as leafy greens, or netted melons), switch to drip irrigation to assure the water does not touch the edible portion of the plant.

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