Examples of Backflow Prevention during Mixing of Agricultural Chemicals

1. What Is Backflow?

Backflow occurs when water flows opposite to its normal direction and can lead to contamination of the original water supply. Backflow can occur when collecting water from a source (well, watercourse, etc.) to combine with agricultural chemicals in a sprayer tank. This can cause chemical contamination of the source water.

2. Preventing Backflow

The following table describes examples of backflow prevention techniques:

Option	Description	Advantage	Disadvantage	Costs/Availability
Use separate water tank	Use an alternate tank to supply water to the sprayer as opposed to filling directly from the well, watercourse, etc. Water is pumped from the source into the water tank and moved to the mixing/ loading area, located an adequate distance from wells and surface water	Complete backflow prevention	Requires an additional step, filling the alternate tank before filling the sprayer tank	Variable cost; the alternate tank should be clean
Anti-backflow device	Install a permanent anti-backflow device on the water supply line to prevent the potential for backflow of chemicals from the sprayer tank. Devices include: double check valve or hose vacuum break valve	Quick solution, requires no monitoring or additional steps after installation	Installation may be complicated, some types are susceptible to damage from debris or freezing	Price ranges from $100.00 to $800.00; can be purchased from plumbing supply stores or most hardware stores.
Maintain an air gap	A permanently fixed air gap between the water supply line and the sprayer tank can be maintained. The gap must be located a distance of at least twice the diameter of the pipe/ hose, above the topmost rim of the sprayer tank, but the gap distance may never be less than one inch (25 mm)	Requires no additional equipment	Requires some monitoring	No cost

Canadian Horticultural Council, **Combined Vegetable Producer, Storage Intermediary and Packer On-Farm Food Safety Manual**, Version 4.0, 2010, Canadian Horticultural Council.

3. Types of Anti-Backflow Devices

The most inexpensive backflow protection option is a hose bibb atmospheric vacuum breaker. It is installed on faucets and hydrants with hose connectors to prevent backflow from a hose. Pressure vacuum breakers may be used on high hazard applications, or applications where valves are located downstream. They often include test cocks that allow for performance checks. However, vacuum breakers must be prevented from freezing when installed outdoors.

Double check valve assemblies are the most common backflow prevention devices used on farms and are best for most non-hazardous situations: These valves have safeguards in two different places and provide a higher level of protection. They are less susceptible to freezing damage and therefore can be installed below ground; however, when debris (sand, clay, insects etc.) becomes lodged in the valve it will fail, so they are less suitable for high hazard applications or when the water source contains debris (e.g., pond, lake).

In cases where there is a high risk of contamination, such as when a farm is connected to a municipal water supply, a reduced pressure zone assembly backflow preventer may be required. These devices have safety checks in place to protect the integrity of the municipal water supply.

4. Where to Place Anti-Backflow Devices

Generally, a backflow preventer should be installed on the line that leads to the cross-connection or potential cross-connection. Exactly where it should be placed depends on the situation. For example, a garden hose connection on a frost-free hydrant would use a hose bib vacuum breaker on the end of the hydrant, at the hose connection. A community pipeline system will often require backflow preventers installed where the community water line enters the farm.

More information and technical assistance on backflow prevention is available through agricultural chemical safety courses.

References:

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