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## Using herbicides in a greenhouse is risky business

*Be aware of how using herbicides, even in an empty greenhouse, may impact your crop*

Controlling weeds in the greenhouse is very important for pathogen and insect control purposes as they can harbor diseases or insects that will affect the crop. In addition, if you have customers in your greenhouses, the presence of weeds can paint your business in an unflattering light (Figure 1). But using herbicides to control weeds can have its risks, especially if using them in an off-label manner. Solar radiation and high temperatures that are often found in greenhouses can not only reduce the effectiveness of the herbicide, but also increases the likelihood of herbicide drift or volatilization.

Drift is the movement of a chemical spray through the

air to an area not intended for treatment. Typically this is because of air currents in the greenhouse that carry the droplets away from where it was sprayed. This is why it is so important to turn greenhouse fans off when applying any kind of chemical in or near the greenhouse.



Figure 1. Weeds under this greenhouse bench not only reflect poorly upon your business, but also may hamper your pathogen and insect management.

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Volatilization is a form of drift (often called vapor drift) whereby a liquid (or a granular substance in the presence of moisture) becomes a gas. Liquid or granular herbicides may volatilize and then move via air currents, landing on and potentially damaging or killing desirable plants.

Herbicide injury symptoms vary by crop but may include discolored, thickened, stunted, or whitening of leaves. Distortion and cupping may also occur. Figure 2 is an example of direct herbicide drift at an outdoor nursery. The adjacent farmer's field was sprayed with herbicide on a windy day and the chemical drifted onto this hydrangea causing leaf

cupping and necrosis. The hydrangea crop did recover as new growth covered the damaged tissues.

Some active ingredients can pose a very high drift hazard because the chemical is so potent. For example, growth regulator herbicides such as 2,4-D, dicamba, and picloram at even very small rates can deform sensitive crops. For this reason, these chemicals should not be used on the outside of the greenhouse, as drift may enter into the greenhouse causing crop damage.

Storing herbicides in an empty greenhouse can be potentially dangerous as well. Consider the following example. A pre-emer-



Figure 2. Herbicide damage on a hydrangea in an outdoor nursery from chemical drift from the adjacent farmer's field.

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gent herbicide intended for use in an outdoor nursery was stored inside an empty greenhouse for the winter. During that time the product volatilized and deposited on surfaces within the greenhouse (plastic, benches, etc.). The herbicide container was removed from the greenhouse before spring crop production began. However volatilization of the deposited residue continued to occur the following spring, well after the herbicide had been removed. This caused damage to spring crops (see Figure 3) that were grown in the contaminated greenhouse. Note that the herbicide

was never even applied in the greenhouse, and yet damage still occurred. This potential for stored herbicides to volatilize increases if granular product is stored in leaky bags or if liquid product is stored in a punctured or weakened plastic container.

Methods to control weeds in a greenhouse include non-chemical and chemical methods. Non-chemical methods include manual removal of the weeds. This is time consuming, but poses no drift/volatilization risk. Another method is to lay weed fabric over dirt floors as a barrier for weed growth (Figure 4).



Figure 3. Herbicide damage of greenhouse plants caused by volatilization of herbicides stored in an empty greenhouse. Plant damage occurred months after the herbicide was removed and crops were planted. The plants recovered upon being moved to a different greenhouse.

For chemical means, there are only a few herbicides labeled for greenhouse use. For empty greenhouses, probably the most common post-emergent herbicide is glyphosate (for example, Roundup Pro or Razor). Glyphosate is a systemic herbicide and should only be used in empty greenhouses. Using glyphosate off-label (for example, when desirable plants are present) can damage ornamentals because of drift or volatilization. It can also be adsorbed to plastic woven weed barrier and can cause plant damage when the roots of desirable green-

house crops move through the bottom of the growing container and come in contact with the herbicide-treated mat.

One new pre-emergent herbicide available for greenhouse use contains the active ingredient indaziflam (for example, Marengo). This product is only labeled for use on greenhouse floors and the greenhouse should also be empty of desirable plants. This product can also be tank mixed with glyphosate if weeds are present to kill existing weeds and provide pre-emergent control at the same time.

Some chemicals that are labeled for greenhouse use when crops are present include the active ingredients of ammonium nonanoate, glufosinate-ammonium, or pelargonic acids. These types of products typically are not systemic and so require complete coverage of the weed to be effective. Most are salt or soap products that operate by desiccation.

Remember to always follow the chemical label when using any product in or near a greenhouse.



Figure 4. Applying a weed barrier over dirt portions of the greenhouse floor will help manage weed problems.