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Identifying and Mitigating Herbicide Contamination in the Greenhouse

Herbicides applied off-site or within the greenhouse can significantly damage ornamental and edible crops. This article illustrates how greenhouse growers can identify, mitigate and prevent issues with herbicide contamination.

One of the most difficult situations greenhouse growers face is a herbicide contamination event and resulting plant injury. Herbicide applications may occur off-site or within the greenhouse, sometimes well before symptoms are noticed. Once affected, plants are often unmarketable (Figure 1). This article provides some examples and basic recommendations for mitigating and preventing herbicide contamination and injury in the future.

Contamination from Greenhouse Flooring

Whether greenhouses have been in operation for several years or several decades, significant changes in management practices and ownership often occur over time. With these changes, prior knowledge of chemical use and misuse may not be known by present day owners and/or growers.

For example, new owners of a production and retail facility experienced problems with leaf distortion on geranium and tomato plants within one of their three greenhouse ranges. Initially, the distortion was attributed to faulty heaters leaking ethylene gas during the cool

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Figure 1. Exposure to herbicides can injure edible and ornamental plants often leaving them unmarketable. Photo by Beth Scheckelhoff

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days and nights of early spring. As the season progressed and heater use ceased, new plants developed symptoms typical of injury from phenoxy herbicides. The commonly used phenoxy herbicide 2,4-D acts like the plant growth regulator auxin, causing distortion to the growing tips of affected plants. In particular, potted plants and vegetable seedlings growing on benches and larger plants growing in containers on the gravel floor exhibited severe symptoms of twisting and curling leaves (Figure 2). No weeds were present under greenhouse benches or along the greenhouse walls in this range.



Figure 2. Phenoxy herbicide damage to tomato transplants and potted geraniums. Symptoms include cupping and curling of leaves, stems and petioles; as well as stunting, streaking and distortion of new growth. Photos by Beth Scheckelhoff

This grower was encouraged to send a gravel and soil sample from the floor to a diagnostic lab (in this case, [South Dakota Agricultural Laboratories](#)) to initially test for the presence of 2,4-D. The lab result was positive at 0.1 ppm. Without exact knowledge of the timing or amount of active ingredient applied to the greenhouse floor, the grower was advised to apply activated charcoal in an effort to neutralize residual herbicide. Recommendations for activated charcoal applications can be found [here](#).

Following a winter application of charcoal, ornamentals have not exhibited herbicide injury symptoms, though

tomato plants continue to show a slight curling of leaves.

Contamination from Irrigation Water

A rural greenhouse using well water for irrigation consistently had trouble growing spring vegetable transplants as well as some ornamental species for many years. The greenhouse changed ownership, and the new owners wanted to solve the recurring issue of poor germination and growth of seedlings in the spring. Upon inspection, plants grown both inside and outside the greenhouse exhibited signs of herbicide exposure and injury (Figure 3). The greenhouse owners did not apply herbicides in or around the structure. Symptoms also did not coincide with nearby agricultural applications, and drifting of field-applied herbicides was ruled out as a possible cause.



Figure 3. Herbicide symptoms on vegetable cabbage and tomato transplants. Symptoms included stunted growth, leaf and stem distortion. Photos by Beth Scheckelhoff.

The common denominator and most likely source of contamination affecting plants over the years was the irrigation water. Although the owners planned to test for herbicide contamination through a diagnostic lab, they first installed a charcoal filter on the irrigation system, and issues with contamination and related symptoms ceased.

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Non-labeled Herbicide Application

Recently, a grower was advised by a local agricultural supplier's sales representative to apply a nonselective post emergence herbicide labeled for application to commercial and industrial sites where bare-ground is desired. The sales representative indicated the product would be appropriate for indoor greenhouse application provided temperatures were not high enough to induce volatilization. The grower applied the herbicide to weeds on the greenhouse floor while spring bedding material was actively growing on benches. All plants in the greenhouse died, weeds and ornamentals alike

Had the grower or sales representative properly reviewed the pesticide label prior to application, they would have read the label statement "NOT FOR USE IN A GREENHOUSE". The pesticide label is the law and must be followed. Not all products are labeled for use in a greenhouse for this very reason. It is extremely important for growers and pesticide handlers to review the entire label before making a pesticide or herbicide application.

I encourage all greenhouse growers to read the NC State extension publication [Greenhouse Weed Control](#). It is a handy reference that can easily be printed and shared with others in your operation.

Herbicide Drift

In some cases, herbicide from a neighboring property will drift into a greenhouse and cause damage (Figure 4). While not fool-proof, it is beneficial for greenhouse owners to develop relationships with surrounding businesses and farms that might be applying herbicides or other chemicals throughout the growing season. Well-intentioned individuals can underestimate the ability of herbicides to drift based upon chemical composition, wind conditions, temperature, boom height, nozzle type, lack of experience and other factors. Open communication with these individuals and requesting notification of upcoming chemical applications can be helpful in preventing damage to growing crops within the greenhouse.

Figure 4. Distortion to poinsettia bracts from fall field applications of herbicide on a neighboring property. Image courtesy of Claudio Pasian, The Ohio State University.

