

Identifying Herbicide Injury in Potato Production

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In January I wrote on herbicide injury because of the increasing number of herbicide injury problems that have been found. In this article I will explain and show specifically what the responses of potato plants are to some common modes of action. Understanding what the mode of action is can help narrow down the type of herbicide and how it can affect plant and tuber growth.

In this article I will discuss some common translocating herbicides I often observe when determining injury in potato plants and tubers. They are, ALS-inhibitors, growth regulators, and EPSP synthase inhibitor (glyphosate). When these compounds come in contact with the plant (through leaves or roots), they will move to the growing points of the plant. Thus, the effects of these herbicides are seen in the young leaves, roots and tubers as they grow out following herbicide exposure.

The ALS-inhibitors cover a number of herbicides, making it difficult to narrow down one specific herbicide when symptoms from this mode of action are identified. Common symptoms may include yellowing of potato leaves, stunted plant growth, and leaflets that wilt/roll (Figure 1), while at higher doses petioles and veins may become reddish/purple in color and leaflets elongate or cup upward/develop a boat shape (Figure 2). Tuber symptoms include smaller size, shallow to deep longitudinal cracks, knobs, and banana, pear or folded shapes. High doses can lead to deep cracking, popcorn-shaped tubers or chaining of tubers. The imidazolinone family (within the ALS-inhibitors) can cause pruned roots and short, slender lateral roots that look like bottle brushes (Figure 3).

Plant growth regulators would include compounds such as 2,4-D, dicamba, clopyralid to name a few. These herbicides can show symptoms quickly and at low doses. Foliage symptoms may include wrinkled and cupped leaves, parallel venation (long, narrow appearance), curling of leaves and leaflets, fiddle necking (folded hooded appearance), and bending and twisting of stems and petioles (Figure 4). Tubers can respond to herbicide injury by having deeper eyes, smaller tuber size, elephant hide on the skin, malformed and cracked tubers, pointed ends or circles around the eyes (Figure 5).

The effects of glyphosate on potato plants can be similar to ALS-inhibiting herbicides. Glyphosate symptoms to the foliage include yellowing of new leaflets, chlorosis or necrosis of leaves, stunting of plant growth, reduced internode length, and reduction in leaf size (Figure 6). The response of tubers to glyphosate may include a reduction in tuber size, irregularly shaped tubers that have folds, cracks, knobs or elephant hide (Figure 7).

Because all of these herbicides move into tubers, they can be stored in seed tubers. When tubers contaminated with an herbicide such as these is planted back the next season, they can cause a

slow and erratic emergence and have similar symptoms to those previously described for injury to the foliage.



Figure 1. ALS-inhibitor injury to potato leaves.



Figure 2. Severe ALS-inhibitor injury to potato foliage.



Figure 3. Severe ALS-inhibitor injury to roots and tubers.



Figure 4. Plant growth regulator injury to potato foliage.



Figure 5. Injury to tuber from plant growth regulators.



Figure 6. Glyphosate injury to potato foliage.



Figure 7. Glyphosate injury to potato tubers.