

## Stunted, Burned, and Crinkled Soybean Plants

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Purdue Weed Scientist's have been pushing the message of using pre-emerge herbicides in soybean over the last couple of years, especially in fields with problem weeds such as marestail, common waterhemp, and Palmer amaranth. We have promoted the use of herbicides containing flumioxazin and sulfentrazone for their residual activity on these problem weeds as well as saflufenacil products that can aid significantly when added to glyphosate burndowns. All of these herbicides are PPO-inhibiting herbicides that have residual activity in the soil and unfortunately pose some crop injury risk under certain weather conditions.

Apparently we are starting to get the message of using pre-emergence herbicides across to producers. Although, the way we know this is the number of calls, reports, and samples we have received with stunted, crinkled, and necrotic soybeans that were injury by the PPO-inhibiting pre-emerge herbicides flumioxazin, sulfentrazone, and saflufenacil.



*Image 1. Soybean seedlings exhibiting injury from flumioxazin due to slowed metabolism and herbicide splash on the hypocotyl, cotyledons, and unifoliate leaves.*

This class of herbicides creates oxygen radicals at toxic levels that destroy the lipids of cell membranes and creates the necrotic spotting and burning that most of us recognize as leaf burning and blazing. These herbicides can be applied to soybean plants because of their ability to rapidly metabolize the herbicide and reduce the levels of toxic radicals. Under stressful growing conditions soybean plants are unable to metabolize these herbicides as quickly leading injurious levels of oxygen radicals. Soybean plants can also sustain injury due to exposure to high levels of these PPO-inhibiting herbicides.

The wet soil conditions and frequent rain events of this planting season have been ideal for soybean injury by soil applied PPO-inhibiting herbicides. The sustained cool wet soil condition that most soybean plants have been emerging this spring are less than ideal for rapid herbicide metabolism and thus has lead to almost certain injury to those fields receiving one of the PPO herbicides. Soybean injury was also increased due to heavy rainfall events that splashed herbicides on the soil surface onto emerging soybean hypocotyls, cotyledon, and/or leaves depending on the soybean growth stage. Injury symptoms include crinkled leaves, necrosis of the hypocotyl and cotyledons, and necrotic spotting on leaves where the herbicide has been splashed during a rainfall event.

# Injured Soybean

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Typically the risk of injury is higher in sandy and coarse soils, although this year it seems as if all soils have been susceptible due to the cool, wet weather conditions.

In the majority of cases soybean plants are able to grow out of the initial injury and yield losses do not occur. Only in rare cases of severe injury to the hypocotyl and/or growing point will replanting be required. If you suspect injury from flumioxazin, sulfentrazone, or saflufenacil on soybean you can send a sample to Purdue Plant and Pest Diagnostic lab (<http://www.ppdl.purdue.edu/PPDL/>) for further confirmation.

The increased amount of injury to soybean this year may cause some of our producers to avoid these particular herbicides in the future. We have seen exceptional weed control out of these PPO-inhibiting herbicides at our Palmer amaranth research site this season, especially with flumioxazin which seems to be causing the majority of soybean injury in the state. So producers need to weigh this risk of temporary injury against quality control of problematic weeds such as Palmer amaranth, common waterhemp, and marehail. In the majority of years these products pose little threat of soybean injury and sustain their level of weed control.



Image 2. The left is a photo of a plot not receiving a pre-emerge herbicide and on the right a plot receiving a pre-emerge application containing flumioxazin. Notice the injury of soybeans by the flumioxazin as well as the reduced population of Palmer amaranth that will be much more manageable as compared to the untreated plot.

Information listed here is based on research and outreach extension programming at Purdue University and elsewhere.

The use of trade names is for clarity and does not imply endorsement of a particular product, nor does exclusion imply non-approval. Always consult the herbicide label for the most current and update precautions and restrictions. Copies, reproductions, or transcriptions of this document or its information must bear the statement:

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