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Plant Clinic Fact Sheet: **Plant Growth Regulator Herbicide Injury**

Plant growth regulator (PGR) herbicides are chemicals that mimic various growth regulating compounds found in plants. PGR herbicides include phenoxyacetic acids (2,4-D, MCPP, and MCPA), benzoic acids (dicamba), and carboxylic acids (clopyralid, fluroxypyr, picloram, and triclopyr). Various formulations of PGR herbicides are available for use by both private and commercial applicators and are frequently used in commercial agriculture and turfgrass maintenance. They may be applied to foliage, or less frequently, to the soil.

Common symptoms of plant injury due to exposure to PGR herbicides include stunting and shortened internodes on stems; twisted, calloused, cracked, or deformed stems and petioles; cupped, puckered, or crinkled leaves; leaf strapping, chlorosis, and mild mosaic pattern on leaves. PGR herbicides are translocated in both the xylem and phloem of the plant, making them systemic herbicides. Often, symptoms of injury are first seen on new leaves or newly developing tissue because the herbicide has been translocated to the new growth.

PGR herbicides can come into contact with off-target plants through particle drift and vapor drift (vaporization). Particle drift occurs when fine spray particles move through the air during application, while vapor drift occurs when the herbicide changes from a liquid to a gaseous or vapor phase due to the herbicides' volatility. Vapor drift can occur at application, or for several days following application. Chemical properties and environmental conditions influence how likely it is for a herbicide to drift, and how far away the herbicide can move from where it was applied.

Damage from PGR herbicides can be superficial, causing minor growth deformities, to more serious, causing yield loss and plant death. The level of damage caused is dependent on many factors, including the amount of herbicide that came in contact with the plant, the sensitivity of the plant, the timing of the injury, and environmental conditions. PGR herbicide injury symptoms can appear similar to damage caused by plant diseases, insect pests, or adverse growing conditions.

If you suspect herbicide damage: plant samples can be submitted to the University of Illinois Plant Clinic. The Plant Clinic does not perform chemical (pesticide) residue tests but pathogens, insects, and arthropods can be identified or ruled out as the cause of the symptoms. For more information about the services offered by the Plant Clinic, please see: <http://web.extension.illinois.edu/plantclinic/>. A pesticide misuse complaint can also be filed with the Illinois Department of Agriculture. The state is asking people to verify potential herbicide damage by consulting a professional such as a Department of Natural Resources forester, forest health expert, certified arborist, consulting forester, or nursery consultant, before submitting the complaint form when possible. For more information about this process, please see: <https://www2.illinois.gov/sites/agr/Pesticides/Documents/pesticidemisusecomplaintform.pdf>. For situations involving major economic loss or widespread damage, tissue testing of affected plants may be warranted. For a partial list of laboratories that can perform pesticide residue testing, please see: <https://uofi.box.com/v/pesticideresiduelabs>.

References:

- Nordby, D., Wiesbrook, M., and Bretthauer, S. (2007). *Field Guide to Herbicide Injury on Landscape Plants*. Urbana, IL: University of Illinois.
Kelly, K., Riechers, D., Nordby, D., and Hager, A. (2004). *Plant Growth Regulator Injury to Soybean* [Factsheet]. Urbana, IL: University of Illinois.

Plant Growth Regulator Herbicide Injury Symptoms



Eastern White Pine. Note the twisted new needles.
Picture: Mary Ann Hanses, Virginia Polytechnic Institute and State University, Bugwood.org



Maple. Note the distorted leaf with paralleled veins.
Picture: Penn State Department of Plant Pathology & Environmental Microbiology Archives, Penn State Uni., Bugwood.org



Grape. Note the puckered leaf tissue, paralleled veins, and distorted leaf margin.
Picture: Paul Bachi, University of Kentucky Research and Education Center, Bugwood.org



Tomato. Note the severe leaf strapping and twisting of the new growth.
Picture: Diane Plewa, University of Illinois Plant Clinic



Redbud. Note the paralleled veins, mosaic coloration, and distorted leaf margin.
Picture: Diane Plewa, University of Illinois Plant Clinic



Hops. Note the puckered and deformed tissue of the leaves and cones.
Picture: David Gent, USDA ARS, Bugwood.org