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## Growth Regulator Injury on Corn

This year, 2006, we have received more samples than normal into the Plant & Pest Diagnostics Lab (P&PDL) which appear to be related to growth regulator herbicide injury. Growth regulator injury in corn can express itself in several ways. One such way is as “goose necked” corn stalks. This is a symptom where the corn stalk develops a kink in its growth then corrects itself to grow straight again resembling a “S” or a goose’s neck. In the cases that have been seen in the P&PDL, there have not been any “S” shaped stalks, but bowed stalks often with other signs of growth regulator injury (Figure 1 and 2). Injury from growth regulators in corn is not the norm, but unpredictable circumstances such as, weather, variable corn growth, and non-label applications can sometimes result in injury to corn.

In some cases, injury can resemble symptoms that can be confused with chloroacetamide herbicides. Growth regulator herbicides that come in contact with corn seed, as can happen if the furrow is not properly closed at planting, can result in the germinating corn plant leafing out underground<sup>1</sup>. In some cases the corn plant’s leaves do not properly unfurl, not allowing the new leaves to separate from each other. It is because of this that there is a preplant interval on many 2,4-D labels before corn can be planted. The preplant interval is at least 7 days after a 1 pint/A rate and 14 days if more than a pint is used for 2,4-D. It is always recommended that seed be planted at least 1.5 inches deep to avoid herbicide contact with either 2,4-D or dicamba. There are no preplant intervals listed on the dicamba labels implying it is safer to use for burndown weed control in corn production.

Postemergence applications of 2,4-D or dicamba can also induce a crop response. This will happen more frequently when high rates or concentrated amounts are placed in the whorl of the corn. In the case of dicamba, 0.5 lb of acid (16 fl oz/A of Clarity) can be use on fine and medium soils from emergence till corn is at the 5-leaf stage or at the most 8 inches or less tall. However, on coarse soils or when the corn is greater than 8 inches tall the rate allowed is reduced to 0.25 lb of acid (8 fl oz/A of Clarity). When using 2,4-D, applications are not recommended when the leaves have just unfolded and applications have to be made before corn is 8 inches tall.

In some cases, injury does not occur in every plant, but will show up on isolated plants in an irregular pattern. These situations can occur when boom height is too low or a partially plugged nozzle is dripping onto leaves that direct the droplet into the whorl. These concentrated jets don’t always hit the whorl, but can hit leaves that direct the herbicide into the whorl, giving a hit or miss injury pattern within the field. If this happens when the plant is young and developing a node’s brace roots, then often the brace roots can become fused (Figure 3). Also at that time, new leaves can be distorted or will not unfurl, as is the case with “buggy whip”, “rat tail”, or “onion leaf” appearances (Figure 1).



**Figure 1 and 2. Corn plant with a bowed stalk and “rat tail”, “onion leaf”, “buggy whip” shaped leaves.**

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When we go out to fields and see these symptoms the next question to follow is will they recover and what will this do to yield? In some cases where corn is injured by growth regulators the corn can become brittle and plants can lodge. Malformed brace roots can only exacerbate the problem. Plants that are lying on the ground can't be harvested. In other cases the fused leaves in "rat tailed or onion leafed" corn emerging from whorl will inhibit tassling. Bob Hartzler of Iowa State University reported some fields 1996 that exhibited this type of injury had 50% barren stalks<sup>2</sup>. Injury to corn while in the V5 to V12, could result in a reduction of ear row, resulting in "beer bottle" ears (a symptom usually reserved for ALS injury); however, it is around the V17 stage that kernels per row is determined<sup>3,4</sup>.

Predicting the yield impact from any herbicide injury can be a precarious situation, especially when not knowing what the environmental conditions might be like for the rest of the year. Counting rows and kernels it is like counting life jackets after the Titanic has sunk. Herbicide injury is like any stress on a growing crop, it will have some impact on the plants performance. To reduce any possible injury situations read and follow labels carefully and be aware and rectify of any mechanical problems with the sprayer.

<sup>1</sup> Kevin Bradley. Accessed June 30, 2006. Preemergence Herbicide Injury Symptoms on Corn. Integrated Pest & Crop Management Newsletter, University of Missouri-Columbia. (<http://ipm.missouri.edu/ipcm/archives/v15n8/ipmltr2.htm>)

<sup>2</sup> Bob Hartzler. Accessed July 3, 2006. Crop Response to Herbicides. Iowa State University. (<http://www.weeds.iastate.edu/mgmt/1996/ICM-1.htm>)

<sup>3</sup> Bob Neilson. Accessed July 3, 2006. Blunt Ear Syndrome in Corn. Plant & Pest Digital Library, Purdue University. ([http://www.ppd.l.org/dd/id/BES\\_corn.html](http://www.ppd.l.org/dd/id/BES_corn.html))

<sup>4</sup> Peter Thomison. Accessed July 3, 2006. When is Corn Ear Size Determined. Ohio State University. (<http://corn.osu.edu/archive/2002/jun/02-19.html#linkc>)

Information listed here is based on research and outreach Extension programming at Purdue University and elsewhere. The use of trade names is for clarity to readers of this publication and does not imply endorsement of a particular brand nor does exclusion imply non-approval. Always consult herbicide labels for the most current and up-to-date precautions and restrictions. Copies, reproductions, or transcriptions of this document or its information must bear the statement "Produced and prepared by Purdue University Extension Weed Science" unless approval is given by the author.



**Figure 3. Brace roots severely damaged from growth regulator injury. In most cases the injury is not this severe.**