



Root Lodging in Corn

- Storms that bring strong winds and abundant rainfall can lead to mid-season corn root lodging.
- Effects of the damage on crop yield potential will be dependent on the current corn growth stage and the pollination process.
- Fields with root lodging should be scouted regularly for foliar diseases.

In ideal situations, roots deeply penetrate the soil to act as stabilizers for the corn plant, anchoring it into the ground. Heavily saturated or dry soils sometime inhibit root development or cause shallow roots, leaving corn plants vulnerable to wind damage.

Lodging Damage

Strong winds can pull shallow roots partially out of the soil. Additionally, the stalks can buckle, causing the plant to lodge. Strong winds from one direction may pull the roots on one side of the plant and push roots further into the soil on the other, thus disrupting the “anchoring” system which may result in buckling. A rotation of the downwind root system by as few as 10 degrees is enough to cause buckling of the corn stalk.¹ Thunderstorms may also provide powerful downdrafts causing lodging in every direction.²



Figure 1. Corn root lodging from wind storm.

Yield Potential After Lodging

The effect of root lodging on crop yield potential is dependent upon the pollination timing in relation to when the wind event took place. Lodging is most likely to occur during mid-vegetative stages when brace roots are not developed. If root lodging happens before pollination, the plant is usually able to recover on its own and return to an upright growth pattern within a few days, without severely affecting crop yield potential.³ However, the lower part of the stalk will likely have a “gooseneck” bend to it that may require slower harvesting to help prevent ear loss. If the wind event and lodging occur during pollination or grain fill, crop yield potential may be decreased.³ If lodging occurs at or near pollen shed, the pollination process may not be completely successful potentially resulting in naked tips or scattered grainfill on the ear. Partial loss of root activity, reduced light interception, and less effective

pollination are factors that contribute to reduced kernel set and grain fill, which in turn can decrease yield potential.

In a study conducted at Iowa State University, corn plants at V10 growth stage were forced into lodging at a 45 degree angle in plots without rootworm infestations. In the two-year study, lodged corn yielded 11 and 40 percent less than the non-lodged control.⁴ In a similar two-year study conducted by the University of Wisconsin, corn was forced into lodging at three different growth stages (Table 1). Results from the trial showed that lodging did not affect plant development, but did increase the number of barren plants. Yield loss varied

between the first and second year of the trial.⁵ Overall, yield was reduced by 2 to 6 percent when corn was lodged between V10 and V12 growth stages, by 5 to 15 percent when lodged between V13 and V15 growth stages, and 12 to 31 percent when lodging occurred after V15 growth stage.⁵

Table 1. Simulated corn root lodging at different corn growth stages. University of Wisconsin.

Year 1 - Lodging Treatments	Grain Yield (bu/acre)	Year 2 - Lodging Treatments	Grain Yield (bu/acre)
Control	199	Control	187
V10	191	V11 to V12	181
V13 to V14	182	V15	168
V17 to R1	151	VT	160
LSD (0.05)	20	LSD (0.05)	10

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Management of Lodged Corn

Depending on the growth stage of the corn crop at the time of the wind event and the severity of wind, corn may or may not return growing upright. It is important to be patient and allow the corn time to recover before estimating potential yield loss. Producers should note the growth stage of the corn and if any brace roots had yet formed. Special management should be considered for plants that are damaged but survive.

Foliar Fungicide Application to Lodged Corn

Fungal diseases can have a devastating effect on the yield potential of corn, especially if corn has lodged, and is laying on each other where it is exposed to pathogens. Fungicides cannot recover yield potential lost due to lodging, but may help protect against further yield reductions due to diseases. Because the chances of a fungicide application being profitable is reduced in fields with lower yield potential, potential fungicide applications should be targeted to fields with high yield potential.

Fields with root lodging should be scouted regularly for foliar diseases. Some of the major corn foliar diseases to watch for include gray leaf spot, Northern corn leaf blight, Southern corn leaf blight, Southern rust, and common corn rust. Before making a fungicide application, consider waiting until the plant is upright to help optimize coverage, assess the success of pollination and yield potential, and always take into account the corn product's susceptibility to diseases. On susceptible corn products, a fungicide application may be warranted if disease is present on the third leaf below the ear leaf or higher on 50 percent of the plants at tasseling.⁷ Also consider the environmental conditions and if the field has a history of disease problems.

Other factors which may contribute to root lodging problems include:

- Rootworm feeding or nematode injury on roots.
- Compaction or cold wet soil conditions early in the season can affect root growth.
- Nitrogen deficiency or inhibition problems caused by low soil pH can reduce root development.⁶

Harvesting Lodged Corn

Corn that has “goosenecked” stalks can be difficult to harvest, resulting in mechanical harvest losses. In areas where corn has lodged because of high winds, the use of after-market corn head reels may be of benefit to help direct stalks into the header. Local equipment dealers, neighbors, and the internet are likely sources for special equipment.

Sources:

- ¹Ennos, A.R., Crook, M.J., and Grimshaw, C. 1993. The anchorage mechanics of maize, *Zea mays*. Journal of Experimental Botany. 44 (1): 147-153.
- ²Nielsen, R.L. 2002. Root lodging concerns in corn. Purdue University Agronomy. www.agry.purdue.edu/ext/corn
- ³Thomison, P. 2010. Effects of pre-tassel root lodging on corn performance. The Ohio State University Extension C.O.R.N. Newsletter. 2009-19. <http://corn.osu.edu>
- ⁴Elmore, R. 2005. Mid- to late season lodging. Iowa State University Extension. www.agronext.iastate.edu
- ⁵Carter, P.R. and Hudelson, K.D. 1988. Influence of simulated wind lodging on corn growth and grain yield. Journal of Production Agriculture. 1 (4): 295-299.
- ⁶Nielsen, R.L. 2002. Root lodging concerns in corn. Purdue University Agronomy. www.agry.purdue.edu/ext/corn
- ⁷Lauer, J. 2011. Yield response of flattened (lodged) corn. University of Wisconsin. Field Crops. <http://ipcm.wisc.edu/blog/2011/>
Web sources verified 6/25/15.

For additional agronomic information, please contact your local seed representative. Developed in partnership with Technology, Development & Agronomy by Monsanto.

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