

Dec 1st, 12:00 AM

# Agronomic responses of corn to stand reduction at vegetative growth stages

Jeffrey A. Coulter  
*University of Minnesota*

Emerson D. Nafziger  
*University of Illinois*

Lori J. Abendroth  
*Iowa State University, labend@iastate.edu*

Peter R. Thomison  
*The Ohio State University*

Follow this and additional works at: <https://lib.dr.iastate.edu/icm>



Part of the [Agriculture Commons](#), and the [Agronomy and Crop Sciences Commons](#)

---

Coulter, Jeffrey A.; Nafziger, Emerson D.; Abendroth, Lori J.; and Thomison, Peter R., "Agronomic responses of corn to stand reduction at vegetative growth stages" (2010). *Proceedings of the Integrated Crop Management Conference*. 3.  
<https://lib.dr.iastate.edu/icm/2010/proceedings/3>

This Event is brought to you for free and open access by the Conferences and Symposia at Iowa State University Digital Repository. It has been accepted for inclusion in Proceedings of the Integrated Crop Management Conference by an authorized administrator of Iowa State University Digital Repository. For more information, please contact [digirep@iastate.edu](mailto:digirep@iastate.edu).

## **Agronomic Responses of Corn to Stand Reduction at Vegetative Growth Stages**

Jeffrey A. Coulter, Emerson D. Nafziger, Lori J. Abendroth, Peter R. Thomison, Roger W. Elmore, and Mark E. Zarnstorff. 201\_. *Agronomy Journal*. Accepted with minor revision.

### ***Abstract***

Yield loss charts for hail associated with stand reduction assume that remaining plants lose the ability to compensate for lost plants by mid-vegetative growth. Yield losses and stand losses after V8 – leaf collar system – and throughout the remaining vegetative stages are 1:1 according to the current standards.

We conducted field experiments from 2006 to 2009 at twelve site-years in Illinois, Iowa, and Ohio to determine responses of corn to stand reduction at the fifth, eighth, eleventh, and fifteenth leaf collar stages (V5, V8, V11, and V15, respectively). We also wanted to know whether these responses varied between uniform and random patterns of stand reduction with differences in within-row interplant spacing.

When compared to a control of 36,000 plants per acre, grain yield decreased linearly as stand reduction increased from 16.7 to 50% (Table 3), but was not affected by the pattern of stand reduction. This rate of yield loss was greatest when stand reduction occurred at V11 or V15, and least when it occurred at V5. With 50% stand loss, yield was 83 and 69% of the control when stand loss occurred at V5 and V15, respectively. With 16.7% stand loss at V5, V8, or V11, yield averaged 96% of the control. Per-plant grain yield increased when stand loss occurred earlier and was more severe. With 50% stand loss at V11 or V15, per-plant grain yield increased by 37 to 46% compared to the control. Corn retains the ability to compensate for lost plants through the late vegetative stages, indicating that current standards for assessing the effect of stand loss in corn should be reevaluated.

### ***Implications***

The results from this study demonstrate that corn plants all the way through V15 retain the ability to increase their per-plant grain yield in response to a reduction in competition from their neighbors. This is primarily due to an increase in kernel number per plant. The accuracy of the current U.S. standard for appraising corn yield following hail-induced stand reduction could be improved by accounting for this ability of the corn plants to partially compensate for lost plants when stand reduction occurs after V8. However, damage to corn from hail is complex, and hail-induced stand reduction is often accompanied with other forms of crop damage.

**Table 3.** Observed corn grain yield means, the corresponding predicted values, and the estimated corn grain yields based on the current U.S. standard for crop insurance adjusters to assess losses in corn grain yield resulting from hail-induced stand reduction (USDA-Federal Crop Insurance Corporation, 2006). Adapted from Coulter et al. 2011.

Corn stage at stand reduction <sup>†</sup>	Final plant density plants/acre (x1000)	Grain yield		
		Observed mean	Predicted value % of control <sup>¶</sup>	USDA-estimated value <sup>‡</sup>
V5	18	82.9	83.3	74
	24	90.8	90.1	87
	30	96.7	96.9	96
V8	18	78.4	79.1	74
	24	89.7	88.3	87
	30	96.9	97.6	96
V11	18	72.9	73.8	50
	24	86.3	84.9	66.7
	30	95.5	96.1	83.3
V15	18	68.7	68.9	50
	24	81.7	81	66.7
	30	92.9	93.1	83.3

† V5, five leaf collar stage; V8, eight leaf collar stage; V11, eleven leaf collar stage; V15, fifteen leaf collar stage (Ritchie et al., 1986).

‡ Based on the procedure described by the USDA-Federal Crop Insurance Corporation (2006).

¶ Control treatment was thinned to a uniform stand of 36,000 plants per acre at the V5 stage with no stand reduction.