

# Early Season Hail Damage in Corn: Effects of Stalk Bruising and Tied Whorls

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## Objective

To determine effects of tied whorls and stalk bruising caused by early season hail damage on corn performance at four on-farm sites. Various agronomic performance parameters including yield, nubbin ears/barren plants, lodging, and silking/pollen shed dates were evaluated.

## Background

Cooperator:	Pendleton	Seymore	Delay A	Delay B
Variety:	Pioneer 33J24	Davis 2711	Pioneer 33J24	Pioneer 33J24
Planting Date:	April 29	May 1	April 26	April 30
Planting Rate:	29,900	26,000	29,000	29,000
Tillage:	Conventional	Conservation	Conventional	Conventional
Fertilizer (N-P-K):	170-78-92	168-78-78	187-69-90	187-69-90
Previous Crop:	Soybean	Soybean	Soybean	Wheat
Soil Type:	Crosby silt loam	Kokomo silty loam	Miamian silt loam	Miamian silt loam

## Methods

On June 5, 2000, a hail storm caused severe injury to corn fields in Fayette County, Ohio. Hail resulted in nearly complete defoliation as well as severe stalk bruising. A week after the hail injury occurred, a high percentage of plants exhibited tied whorls. While there is extensive information on defoliation effects on corn growth and agronomic performance, little information exists on effects of bruising and tied whorls on subsequent plant growth and survival.

On June 12, plots consisting of 30 feet of row, replicated eight times, were established at each of four on-farm sites. Plants were rated according to a predetermined scale using four different categories (normal growth, tied whorl, abnormal growth, and dead) on three dates following the hail injury. Plots exhibiting major damage were associated with extensive hail-induced stalk bruising and scarring, whereas plots with minor damage were associated with little or no stalk bruising. Plots with major damage were completely defoliated, whereas plots with minor damage exhibited 80 to 90% defoliation based on visual estimates.

Data was also recorded for plant heights, silking/pollen shed dates, barren plants (including plants with poorly developed ears), and lodging. Stalk lodging and barrenness were expressed as a percentage of final plant stand. On September 19, plots were hand harvested, and yields were adjusted to 15.5% moisture. It was not possible to randomize treatments because replicates were adjacent rows. Standard errors were computed for grain yield data to provide a measure of variability across replicates within treatments (plots with major and minor damage).

## Results

	Pendleton		Seymore		Delay A		Delay B	
	Major	Minor	Major	Minor	Major	Minor	Major	Minor
Growth stage when damage occurred	V6		V5		V7		V5	
Leaves damaged <sup>1</sup>	100	90	100	80	100	90	100	90
Tied Whorls, % <sup>2</sup>								
June 12	53	20	56	44	36	40	61	22
June 23	24	6	6	1	13	9	8	5
July 6	9	3	0	0	6	7	1	2
Canopy Height (in.)								
June 12	11	14	4.9	12.8	24.6	23.4	12	33.6
June 23	33.6	45.6	14.7	23.8	38.7	41.2	28.1	52
July 6	64.9	79.7	37.3	53.5	69.9	73.7	62.7	93.3
Silking, % <sup>2</sup>								
July 13	-	-	0	0	-	-	32	86
July 18	-	-	12	31	-	-	63	100
July 21	-	-	32	71	-	-	77	100
July 25	-	-	58	90	-	-	84	100
August 1	-	-	85	100	-	-	-	-
Final Stand (plants/A)	28,895	28,895	16,408	23,087	26,717	26,572	25,846	26,717
Barren Plants, % <sup>2</sup>	12.3	8.5	18.8	5	13.8	11.3	16.8	10.8
Lodging, % <sup>2</sup>	1.5	0.5	0	0.8	0.5	0.5	0.5	0.5
Grain Moisture, %	21.3	18.9	28.9	25.7	18.9	19.2	21.3	19.6
Yield (Bu/A)	159.8	194.1	93.3	186.5	164.8	176.7	147.5	169.5
S.E. (yield)	4.8	10.1	11.8	3	10	7.8	10.8	12.3

<sup>1</sup> Visual estimate percent.

<sup>2</sup> Percentage of final stand.

## Summary and Notes

During the three- to four-week period following the hail storm, the number of plants exhibiting tied whorls decreased. Plots that received major damage from hail exhibited 36 to 61% tied whorls on June 12, which decreased to 0 to 9% by July 6. Also, canopy heights of plots with major damage were 3.8 to 30.6 inches shorter compared to plots with minor damage on July 6. Silking was delayed by approximately 1 to 1.5 weeks in the plots with major damage vs. plots with minor damage. Severe stalk bruising did not increase lodging; lodging was negligible across farm sites, averaging less than 2%. Kernel moisture at harvest was generally higher in plots with major damage (in three of the four fields), and yields were lower compared to the plots with minor damage.

Yields of plots with major damage ranged from 93.3 to 164.8 bu. per acre compared to yields ranging from 169.5 to 194.1 bu. per acre in plots with minor damage. One site experienced large stand losses (Seymore), which contributed to the greater yield difference between plots with major and minor injury, compared to the other three sites. Overall growing conditions following hail damage were favorable; more stressful conditions following the hail storm might have retarded the regrowth of damaged plants and increased differences in yield between plots exhibiting major and minor damage.

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