

# Greensnap Effects on Corn Yields in the Eastern Corn Belt

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## Introduction

Greensnap in corn (also referred to as "brittle snap") is pre-tassel stalk breakage caused by high winds. Breaks in the stalk usually occur at nodes below the ear. Agronomic factors influencing greensnap have been well documented in the Western Corn Belt where wind damage is a frequent problem (Elmore and Ferguson, 1999; Wilhelm et al., 1999). However, little is known concerning the susceptibility of corn hybrids grown in Ohio to greensnap and the role that various management practices may play in predisposing corn to greensnap injury. A major wind event in Ohio on 29 June, 2012, with gusts up to 70-80 mph, provided an opportunity to evaluate cultural practices affecting susceptibility to greensnap in existing studies.



Figure 1. Most greensnap occurred at several nodes below the primary ear node, often at nodes near the soil surface. S. Charleston, 6/29/12

## Objectives

Observations of existing field studies were taken to determine:

1. Effects of stalk breakage on grain yields of corn hybrids grown in Ohio.
2. Effects of various management practices on susceptibility to stalk breakage.

## Materials and Methods

This report summarizes data from several hybrid, plant population, planting date, and planting depth studies, which exhibited green snap injury following a major wind storm on 29 June, 2012.

### Experiment 1. Hybrid Differences

Hybrid differences in greensnap and grain yield were recorded at two locations of the Ohio Corn Performance Test (OCPT) - South Charleston and Upper Sandusky. Table 1 indicates the numbers of hybrid entries, soil type, planting date, tillage, and plot size associated with each test location. Previous crop was soybean at each location. Hybrid entries represented maturities ranging from approximately 102 to 120 days. At each location, hybrids were replicated three times in a randomized complete block.

Table 1. Number of hybrid entries, planting dates, tillage, plot size and soil types associated with each test location.

2012 OCPT Location	Hybrid Entries	Planting Date	Tillage	Plot Size	Soil Type (taxonomic name)
OARDC Western Agricultural Research Station S. Charleston Clark County West Central Ohio	131	5/18/12	Fall Chisel Plow	10' x 25'	Kokomo silty clay loam (fine, mixed, mesic Typic Argiaquoll)
			Spring Field Cultivate		
Upper Sandusky Wyandot County Northwest Ohio	157	5/16/12	Fall Chisel Plow	10' x 25'	Blount silt loam (fine, illitic, mesic Aeric Epiqualf)
			Spring Field Cultivate		

## Acknowledgements

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## Materials and Methods

### Experiment 2. Effect of Hybrid and Plant Population

The experiment was established on a Kokomo silty clay loam at S. Charleston. Experimental treatments were replicated three times in a randomized complete block arranged in a split-plot layout. Plant populations were whole plots and hybrids were subplots. Plots were planted using minimal tillage on 14 May, 2012 to achieve five plant densities (18000, 26000, 34000, 42000 and 50000 plants A<sup>-1</sup>). Twenty-five Pioneer brand hybrids with Comparative Relative Maturity (CRM) ratings ranging from 102 to 120 were evaluated. Plots were four 30-inch rows wide by 25 ft. long.

### Experiment 3. Effect of Planting Date, Hybrid, and Planting Depth

The experiment was established at S. Charleston in fields representing different soil types. The experiment was replicated four times in a randomized complete block arranged in split-split-plot layout. The main plot was planting date, subplot was planting depth, and sub-subplot was hybrid. Plot size was four 30-inch rows 50 feet in length. Two fields, one characterized by a Kokomo silty clay loam, and another in close proximity, characterized by a Crosby silty loam, were planted using minimal tillage on 18 April, 12 May, and 8 June, 2012. Three Pioneer brand hybrids with CRM ratings of 109, 108, and 107 were planted at three seeding depths (0.5, 1.5, and 2.5 inches). The Pioneer brittle snap ratings for the three hybrids were 5, 5, and 3, respectively, based on scale where 1 is poor and 9 is outstanding.

In 2012 most of the greensnap injury observed was associated with stalk breakage near the soil surface (Figures 1 and 2). Percent stalk breakage was calculated based on total numbers of plants with stalk breakage plot<sup>-1</sup> divided by total number of plants plot<sup>-1</sup>. Linear regression analysis was used to determine the relationship between corn yield and broken stalks in Experiments 1 and 2.

## Results



Figure 2. Greensnap resulting from wind storms, S. Charleston, 6/29/12

### Experiment 1. Hybrid Differences

•Corn was at V12 at S. Charleston and V13-14 at U. Sandusky when wind damage occurred.

•Stalk breakage of hybrid entries at S. Charleston and U. Sandusky ranged from 0-44% and 0-35% (Figures 3 and 4).

•High levels of stalk breakage were evident in a limited number of hybrids.

•At S. Charleston, 20 of the 131 hybrids and at U. Sandusky, 22 of the 157 hybrids exhibited stalk breakage of 10% or greater.

•At S. Charleston, grain yield was reduced 1.5 bu A<sup>-1</sup> for every 1% increase in stalk breakage. At U. Sandusky, grain yield was reduced 1.0 bu A<sup>-1</sup> for every 1% increase in stalk breakage.

## Results

Figure 3. Relationship between stalk breakage and grain yield of different corn hybrids, S. Charleston, 2012 (Exp. 1)

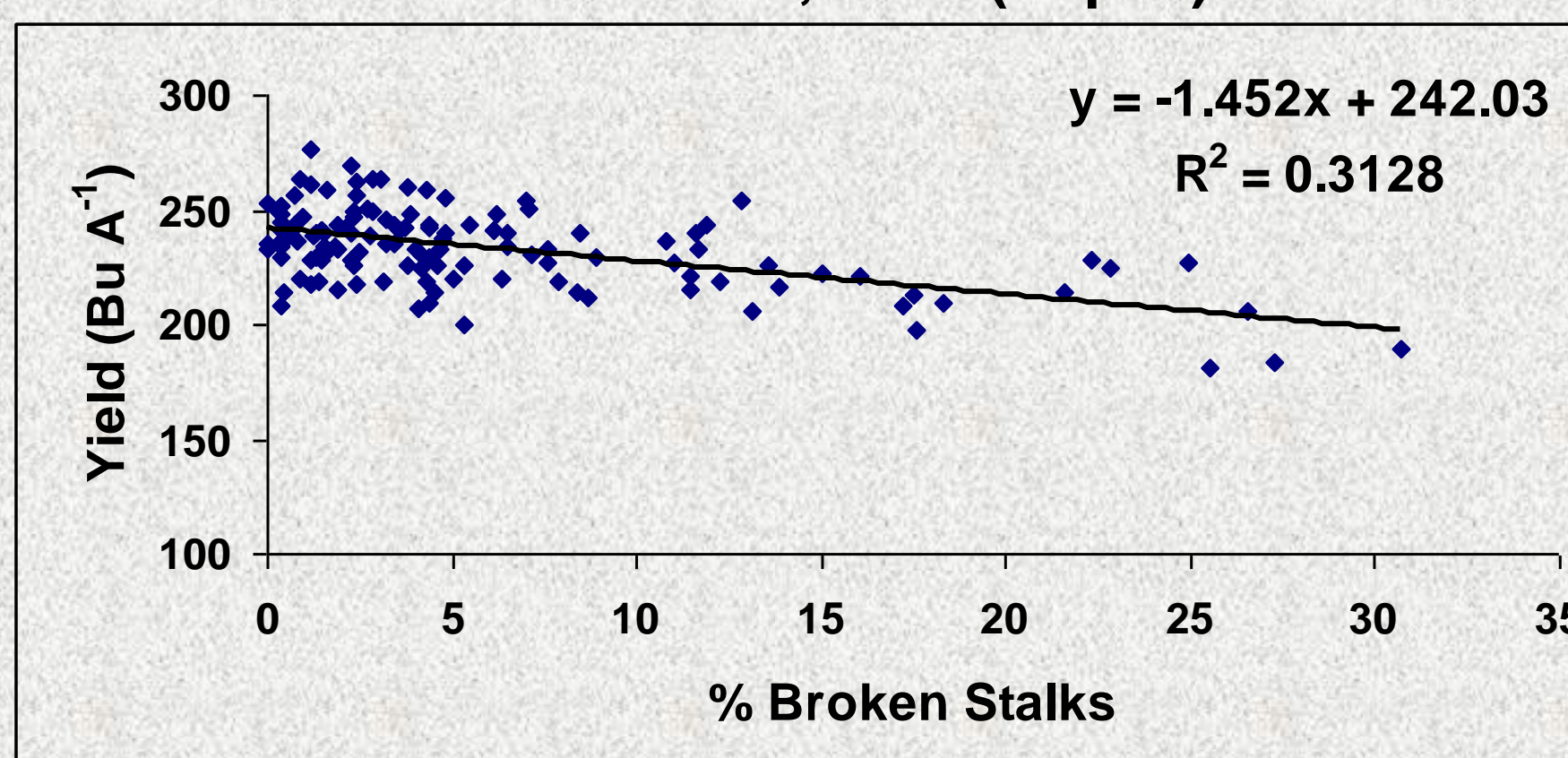
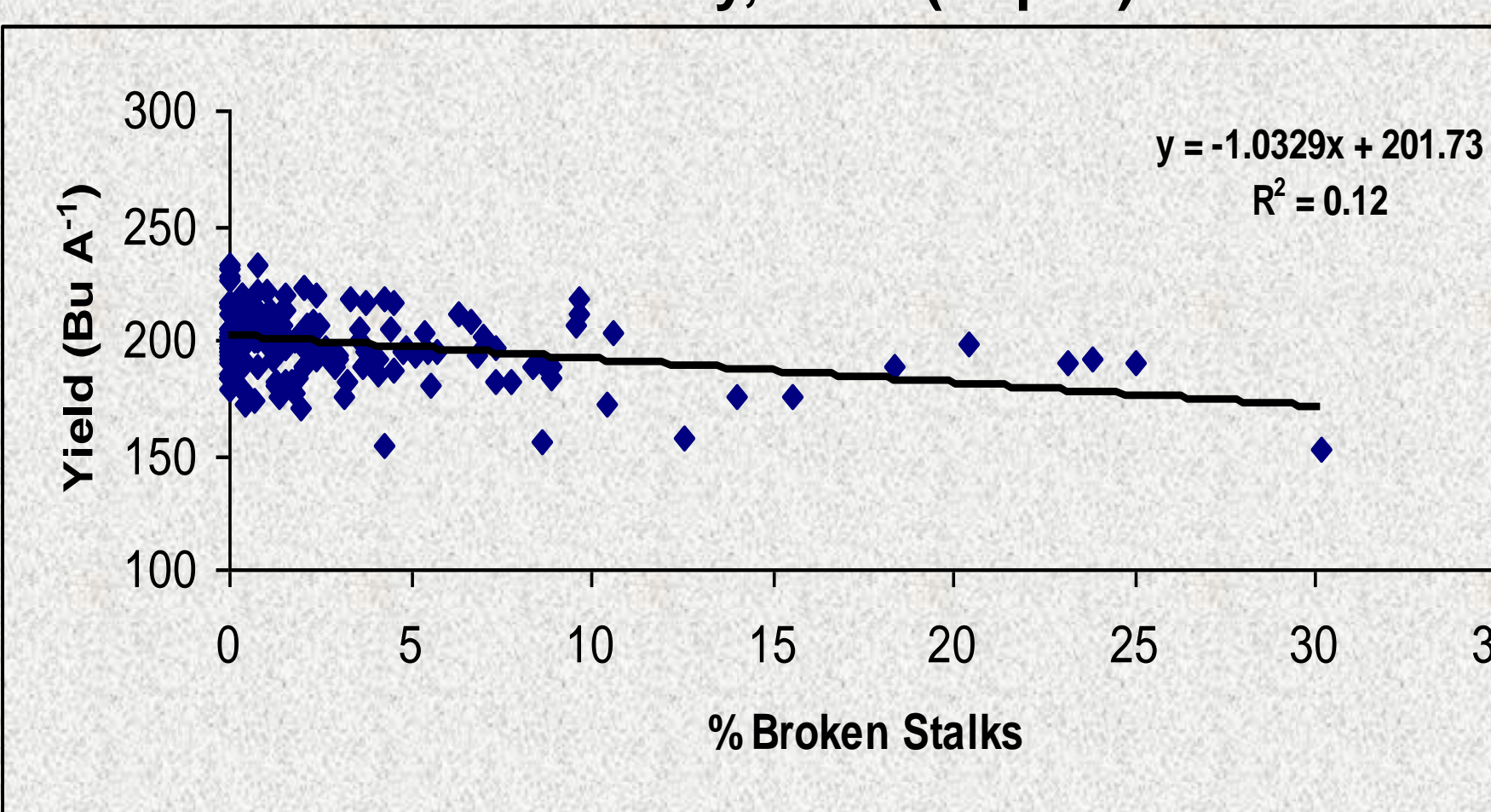


Figure 4. Relationship between stalk breakage and grain yield of different corn hybrids, U. Sandusky, 2012 (Exp. 1)



### Experiment 2. Effect of Hybrid and Plant Population

•Corn was at V13-14 when wind damage occurred.

•No hybrid x plant population interaction for greensnap was present.

•Stalk breakage was not affected by plant population (Figure 5).

•Stalk breakage of hybrids, averaged across plant population, ranged from 1 to 42% (Figure 6).

•No relationship between susceptibility to greensnap and hybrid maturity was evident (Fig. 7).

•Hybrid grain yield, averaged across plant populations, was reduced 1.1 bu A<sup>-1</sup> for every 1% increase in greensnap (Fig. 6).

Figure 5. Relationship between plant population and stalk breakage of different hybrids, S. Charleston (Exp 2)

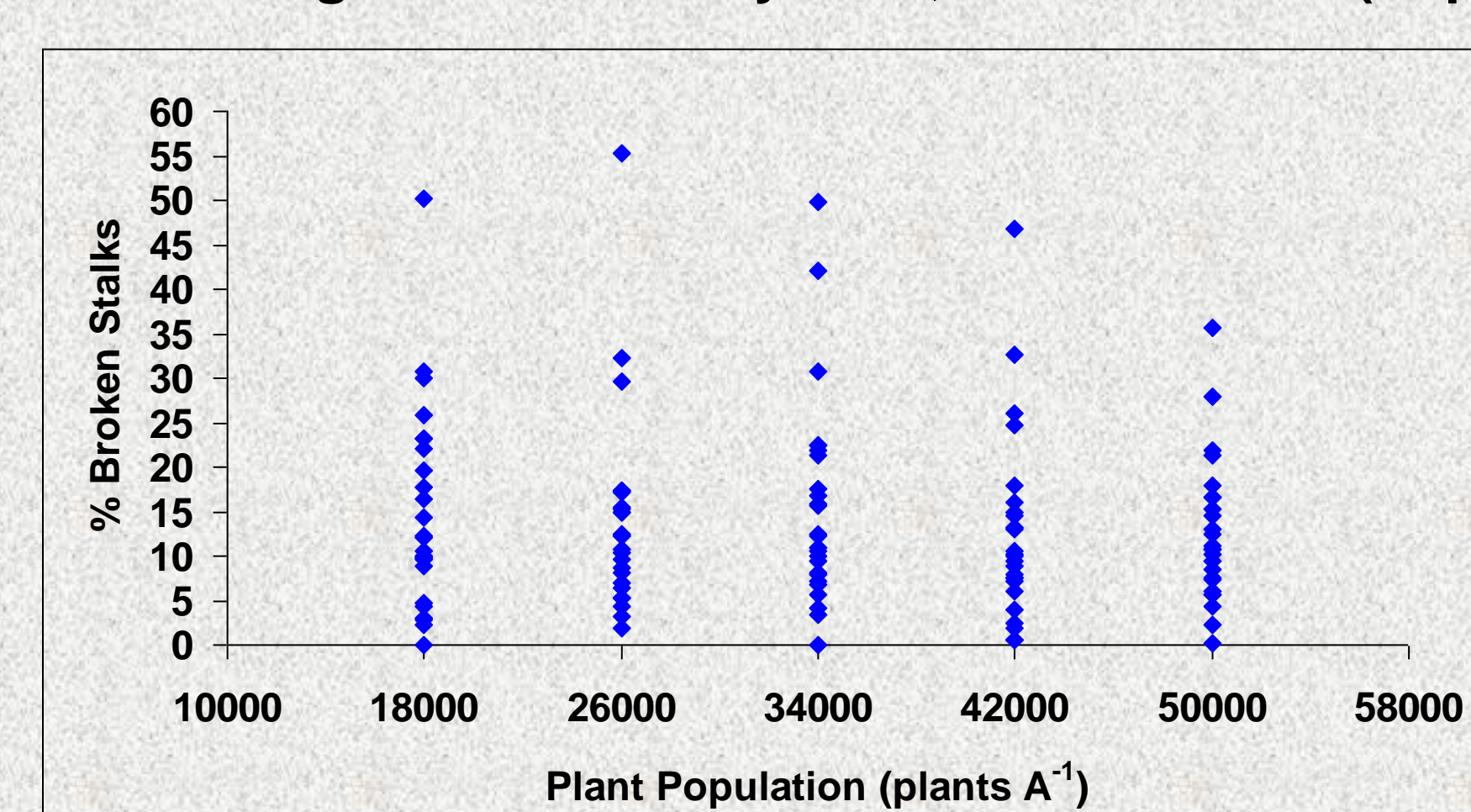
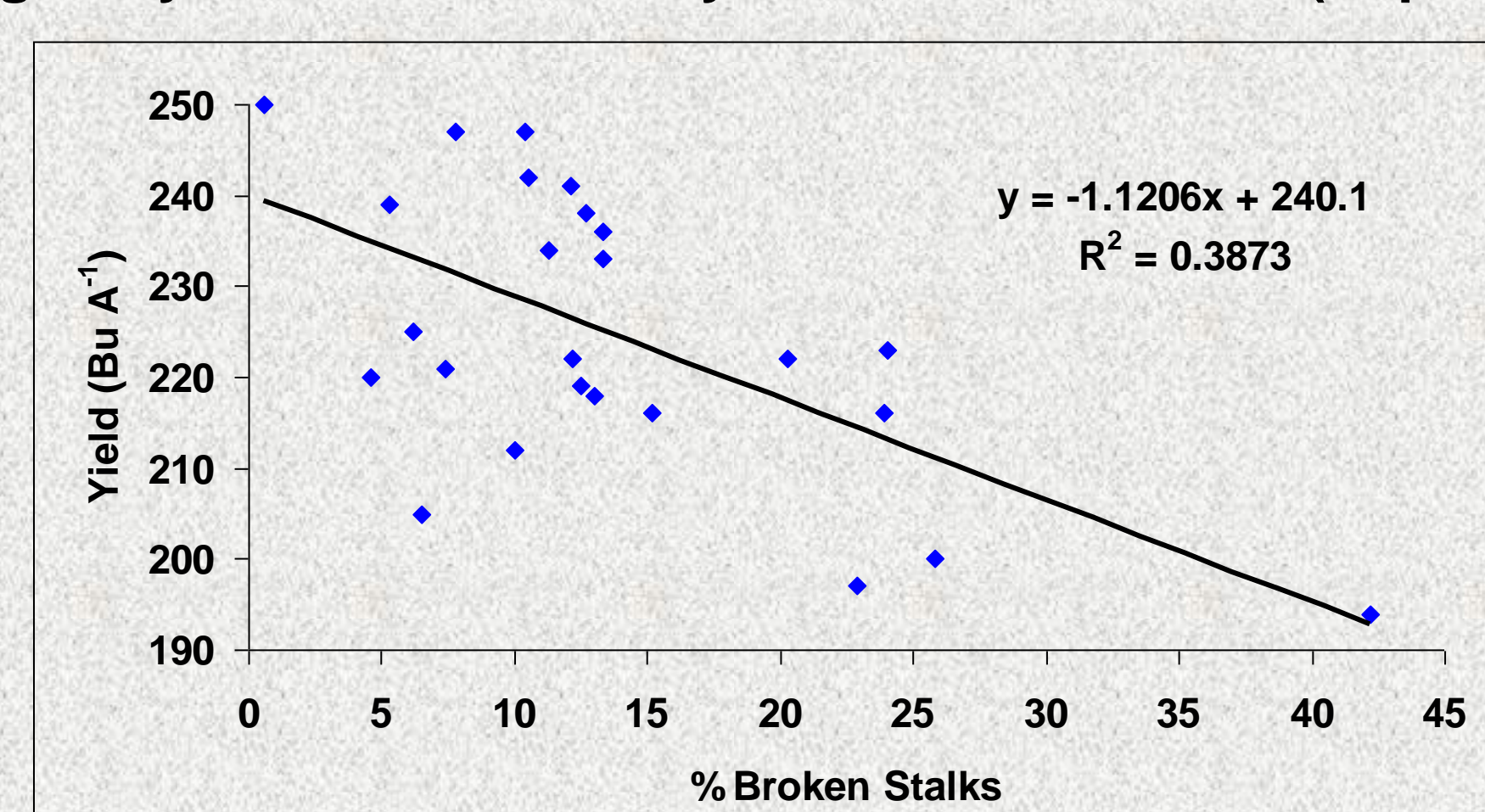
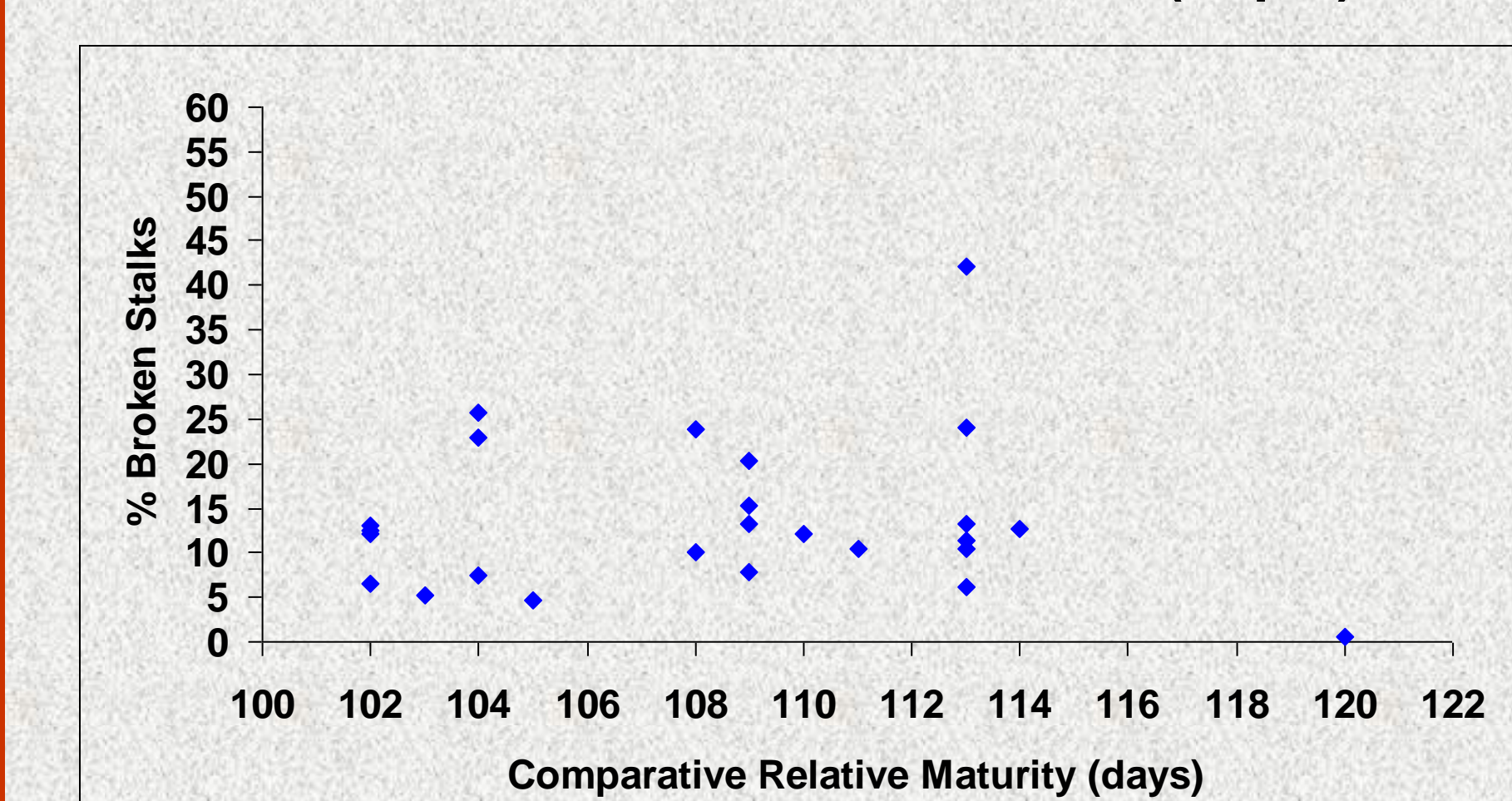


Figure 6. Relationship between stalk breakage and grain yields of different hybrids, S. Charleston (Exp. 2)



## Results

Figure 7. Relationship between hybrid maturity and broken stalks, S. Charleston, 2012 (Exp 2)



### Experiment 3. Effect of Planting Date, Hybrid and Seeding Depth

•When the 29 June wind event occurred, corn growth stage was VT, V13-14, and V5-6 for the 18 April, 12 May, and 8 June planting dates, respectively, for both soil types.

•Differences in susceptibility to greensnap varied considerably between hybrids and planting dates (Table 2).

•No greensnap was evident for corn planted on 18 April and 8 June.

•For corn planted on 12 May, stalk breakage on the Kokomo soil, averaged across planting depths, was 31% for the 107 d hybrid compared to 1% or less for the 108 and 109 d hybrids; on the Crosby soil, it was 14% compared to 1% or less for the 108 and 109 d hybrids.

•No consistent planting depth effects on greensnap were evident (data not shown).

Table 2. Planting date and hybrid effects on broken stalks and grain yield, Crosby and Kokomo soils, S. Charleston, 2012 (Exp. 3)

Planting Date	Hybrid	Crosby		Kokomo	
		Broken Stalks	Yield	Broken Stalks	Yield
		-----%-----	-Bu A <sup>-1</sup> -	-----%-----	-Bu A <sup>-1</sup> -
4/18/12	107-day	0	144	1	159
	108-day	1	157	1	175
	109-day	0	171	1	187
5/12/12	107-day	14	147	31	115
	108-day	1	168	1	178
	109-day	1	171	1	180
6/8/12	107-day	0	114	0	147
	108-day	0	119	0	153
	109-day	0	126	0	151
LSD (0.10)		2	8	6	11

## Summary

➢Susceptibility to greensnap varied considerably among hybrid entries in the OCPT. A majority of the hybrids exhibited less than 5% greensnap as a result of the 29 June wind event.

➢Grain yield was reduced 1 to 1.5 bu A<sup>-1</sup> for every 1% increase in stalk breakage.

➢Effects of plant population and seeding depth on greensnap were not evident.

➢Soil type and planting date played a major role influencing susceptibility to greensnap.

## References

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