

# Plant Population Affects “Zipper Ears” in Corn

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## Introduction:

Zipper ears in corn are characterized by missing entire or parts of kernel rows due to poor pollination and kernel abortion. Kernel abortion usually results in poor tip fill on an ear of corn (“tip die back”) but in recent years, zipper ears have become more common. Zipper ears are often associated with stress conditions, such as drought. Little is known concerning effects of cultural practices, such as hybrid selection and seeding rates, on zipper ears, and the impact of zippering on ear yield components.



Examples of “Zipper Ears”

## Objectives:

1. To determine effects of plant population on zipper ear formation.
2. To evaluate the impact of zippering on ear yield components at different plant densities.

## Materials and Methods:

- Field tests were conducted at four Ohio locations in 2011 - Hebron, South Charleston, Hoytville and Wooster.

- A hybrid observed to exhibit high levels of zipper ears was planted at three seeding rates - 67,900, 95,100, and 122,200 seeds/ha to achieve final plant populations of 61,700, 86,400 and 111,100 plants/ha.

- Seeding rate treatments were arranged in a randomized complete block design with three replications at each location.

- Plots were visually rated for ear zippering at or just prior to maturity using the following 1-5 scale where 1=no zippering; 2=small number of missing kernels; 3=1 row affected (i.e., exhibiting missing and/or aborted kernels) ; 4=2 rows affected; 5=3 or more rows affected. The degree of zippering in the field is the average of 30 consecutive plants in a row.

- Ten ears were sampled from randomly selected plants in each plot shortly before harvest and were rated with the same 1-5 scale used to assess plots for zippering in the field; ears were evaluated for kernel rows, kernels per row, kernels per ear, unfilled tip length, ear length, ear weight, and 300 kernel weight.

- Analysis of variance was performed and least significant differences calculated at probability level 0.10 (LSD 0.10) to test for differences among means.

## Results and Discussion:

- Effect of plant population on zipper ears was similar across the four test locations (Figure 1).

- Increases in plant population rates from 61,700 to 111,100 seeds ha<sup>-1</sup> increased ear zipper ratings in the field from 1.7 to 4.4 and 1.4 to 3.7 for sampled ears and were associated with a significant reduction in kernel rows, kernels per row and kernels per ear (Figure 2, Table 1).

- A greater degree of zippering was associated with a reduction in kernels per ear and ear weight (Figures 3 and 4).

Figure 1. Effect of plant population on degree of ear zippering.

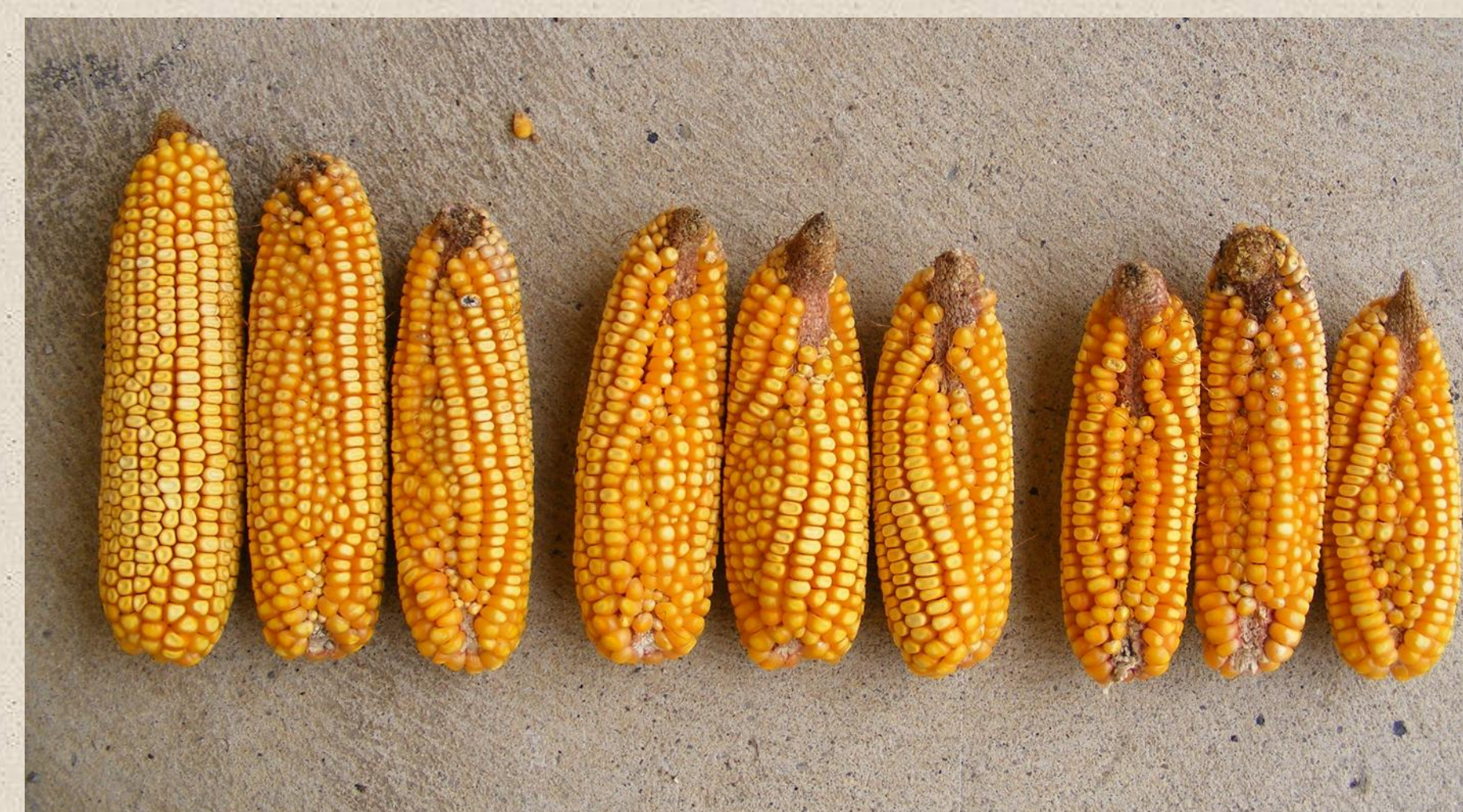
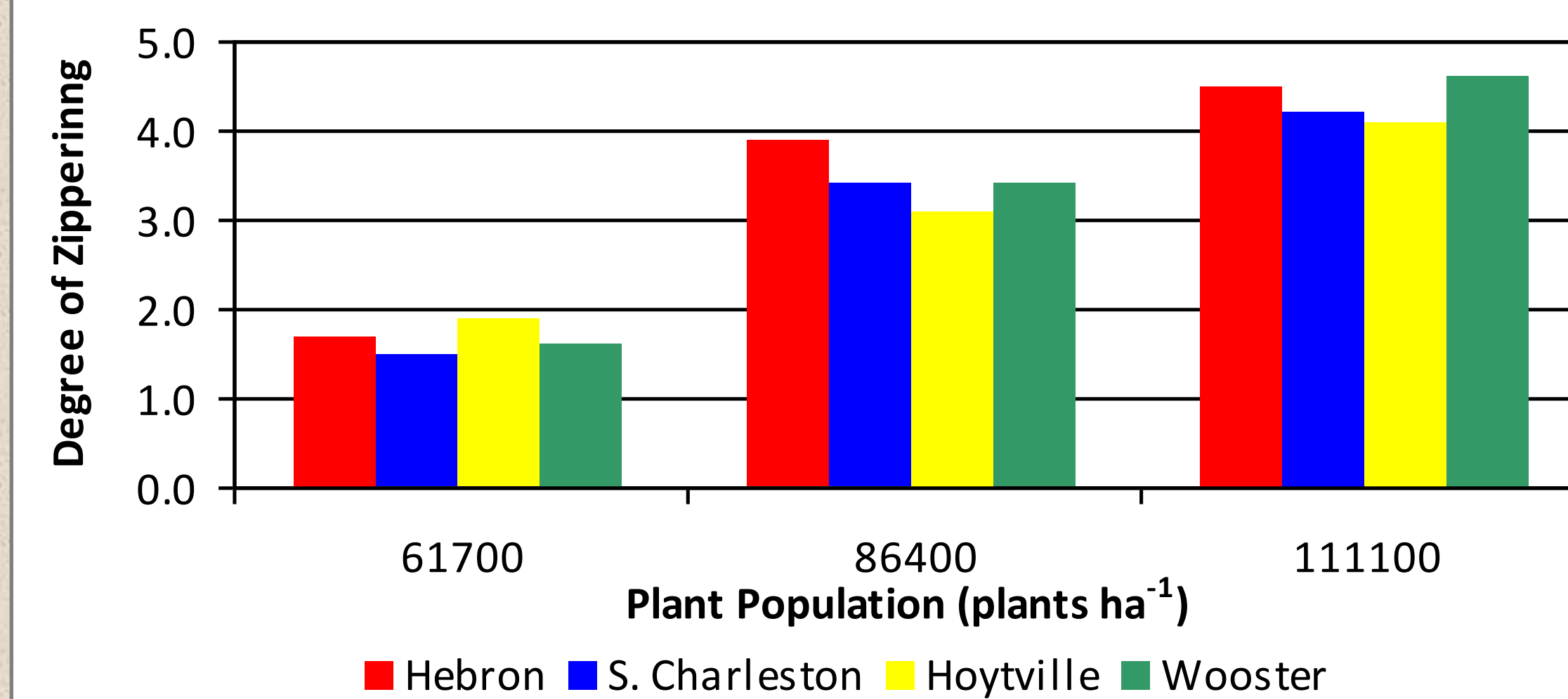


Figure 2. Zipper ear symptoms exhibited at (left to right) 61,700, 86,400 and 111,100 plants ha<sup>-1</sup>

Table 1. Effects of plant population on degree of zippering, kernel rows, kernels per row and kernels per ear, averaged across four Ohio locations.

Plant Population --plants ha <sup>-1</sup> --	Degree of Zippering†		Kernel Rows	Kernels per Row	Kernels per Ear
	Field‡	Ear Sample‡			
61,700	1.7	1.4	20	33	654
86,400	3.4	2.9	18	30	530
111,100	4.4	3.7	17	27	452
LSD (0.10)	0.2	0.3	1	1	39

† Based on a 1-5 scale where 1=no zippering; 2=small degree; 3=1 row affected; 4=2 rows affected; 5=3 or more rows affected  
‡ Field=Degree of zippering in field is the average of 30 consecutive plants in a row; ear sample=degree of zippering observed in 10 ears sampled from field

Figure 3. Relationship between degree of ear zippering and ear weight at three populations, averaged across locations.

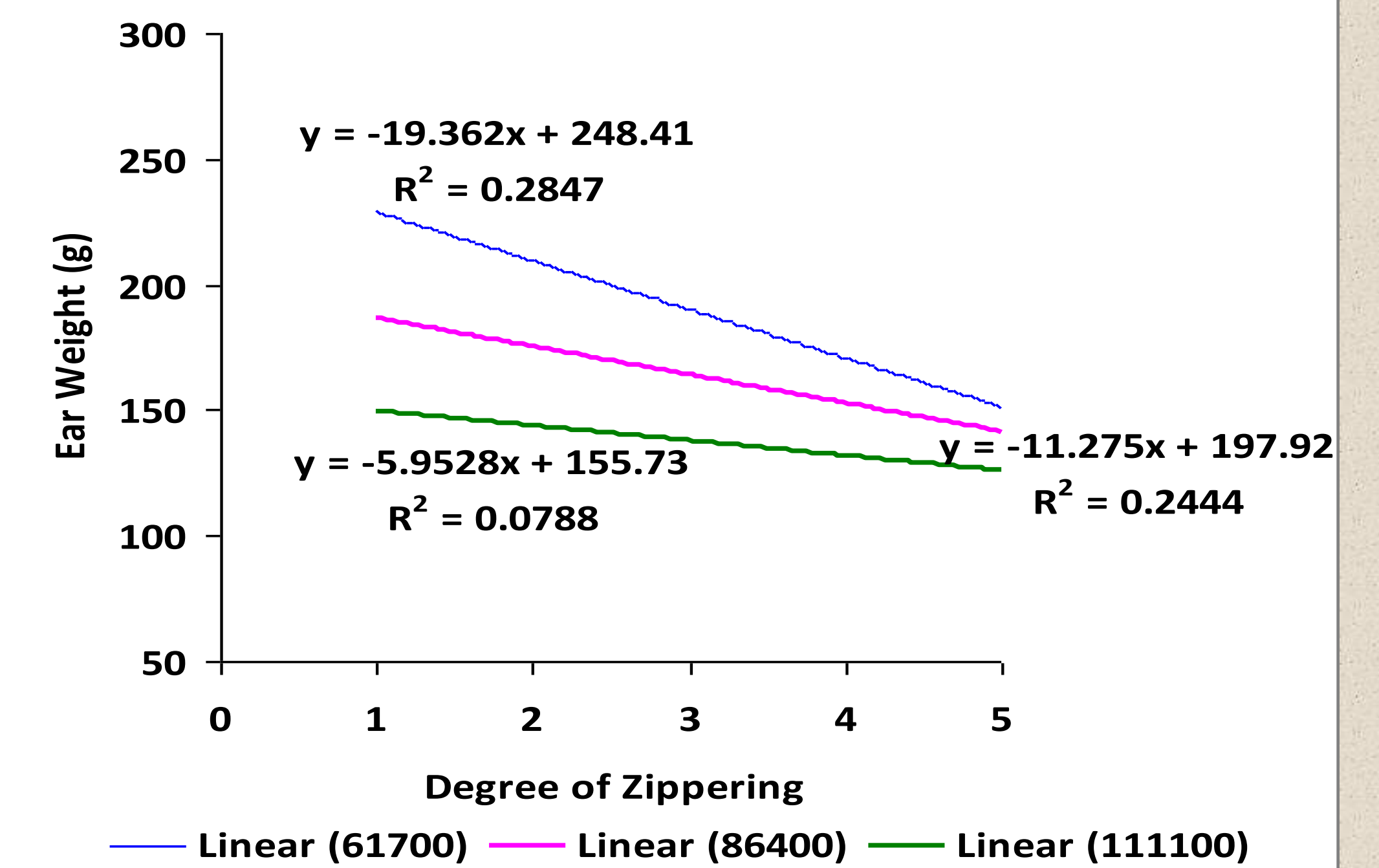
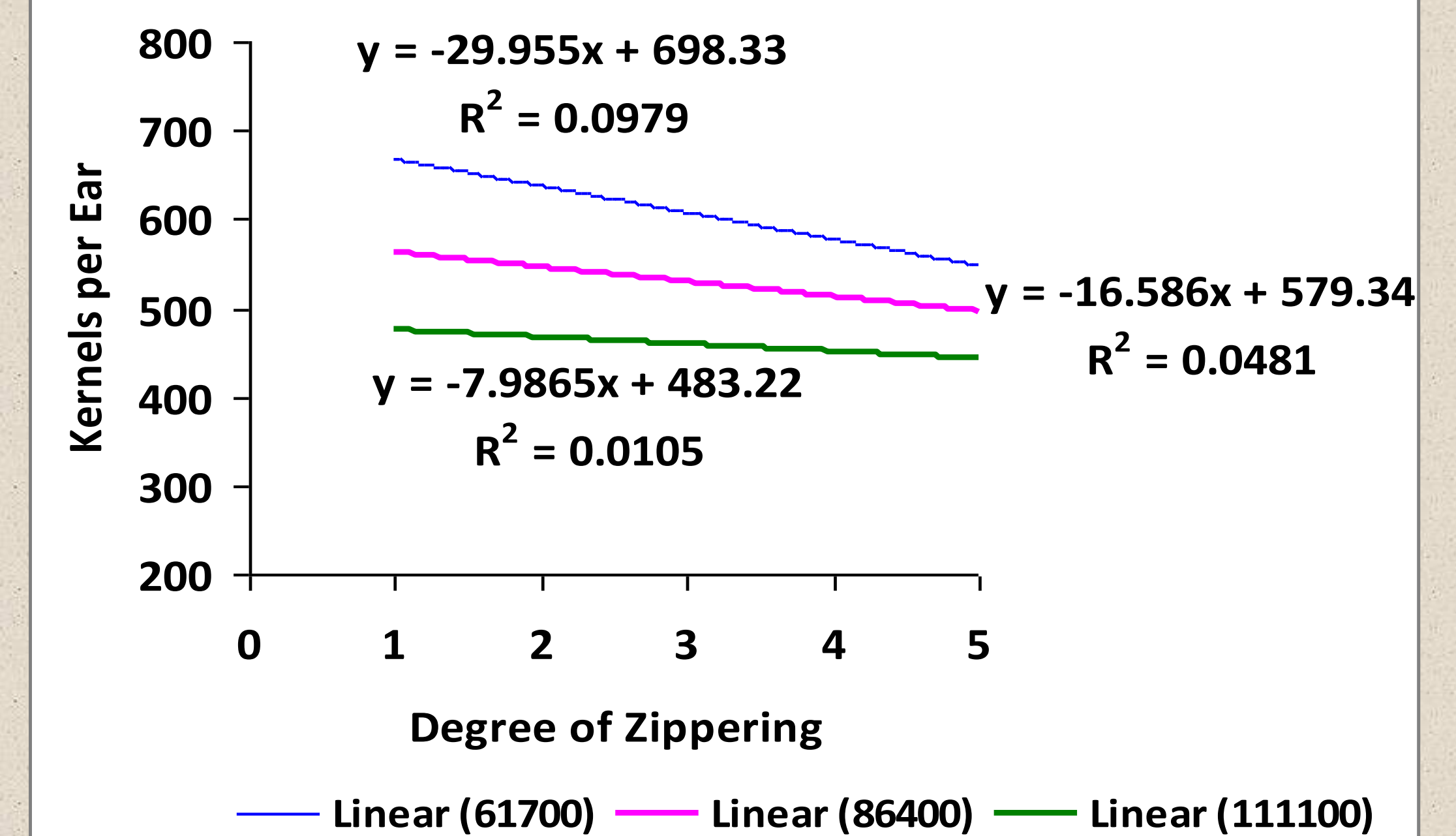


Figure 4. Relationship between degree of ear zippering and kernels per ear at three populations averaged across locations.



## Summary:

- Increasing plant population consistently resulted in a greater degree of ear zippering across test locations.

- Ears that exhibited greater zippering generally had lower ear weights; this varied depending on plant population.

- The relationship between zippering and kernel numbers was less pronounced due to variability in ear sizes especially at higher plant population.

## References:

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