

# The Bee's Knees: Are Pollinator Visitations Related To Crop Yield In Urban Farms?



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## Introduction

- Pollinator decline is a trend seen globally, raising concerns over the estimated 87.5% of flowering plants that rely on animal pollinators, especially concerning food crops
- The growth of urban spaces leads to unpredictable levels of pollinator diversity and populations such as with bees
- The lack of green spaces, increase in impervious surfaces, and climate change work together to drastically affect pollinator visitation, or the amount of times flowers are visited by bees and other pollinators, in turn affecting crop yield
- The decline of honey bees heightens the necessity to study native pollinators and their populations in urban agriculture, where crop yields tend to see more variation

## Hypothesis

There is a significant difference between pollination visitation and crop yield in varying degrees of urbanized field sites



Maddy (Left), Esmeralda (Middle), and Alex (right), at Farm On Ogden

## Methods

1. 10 control and 10 experimental plants at 6 sites with varying levels of urbanization
2. Hand pollinated experimental plants, marked pollinated and missed flowers on experimental plants, and marked female flowers on control plants
3. Conducted individual and broader pollinator observations in 10 minute increments. GoPros were also used for observations
4. Harvested fruit, counted seeds and measured diameter and mass
5. We evaluated the data through ANOVA analysis



Fig 1 A.) A map of the 6 sites in Chicago. B.) Harvested and marked patty pan squash (*cucurbita pepo*). C.) Harvested tomatoes (*solanum lycopersicon*) from Farm On Ogden

## Results

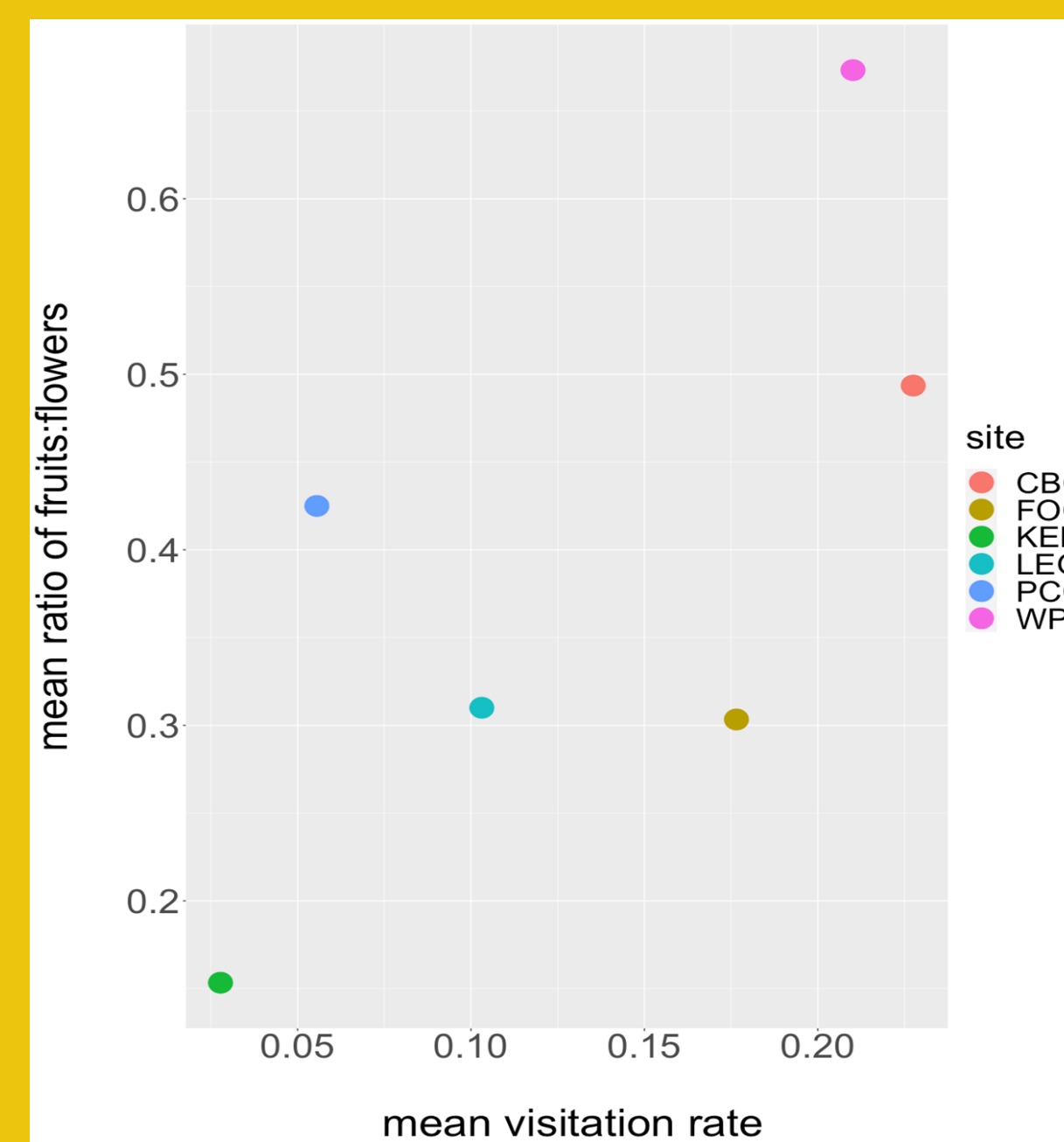


Fig 2. Rate of Pollinator Visitation Versus The Proportion of Flowers To Fruits

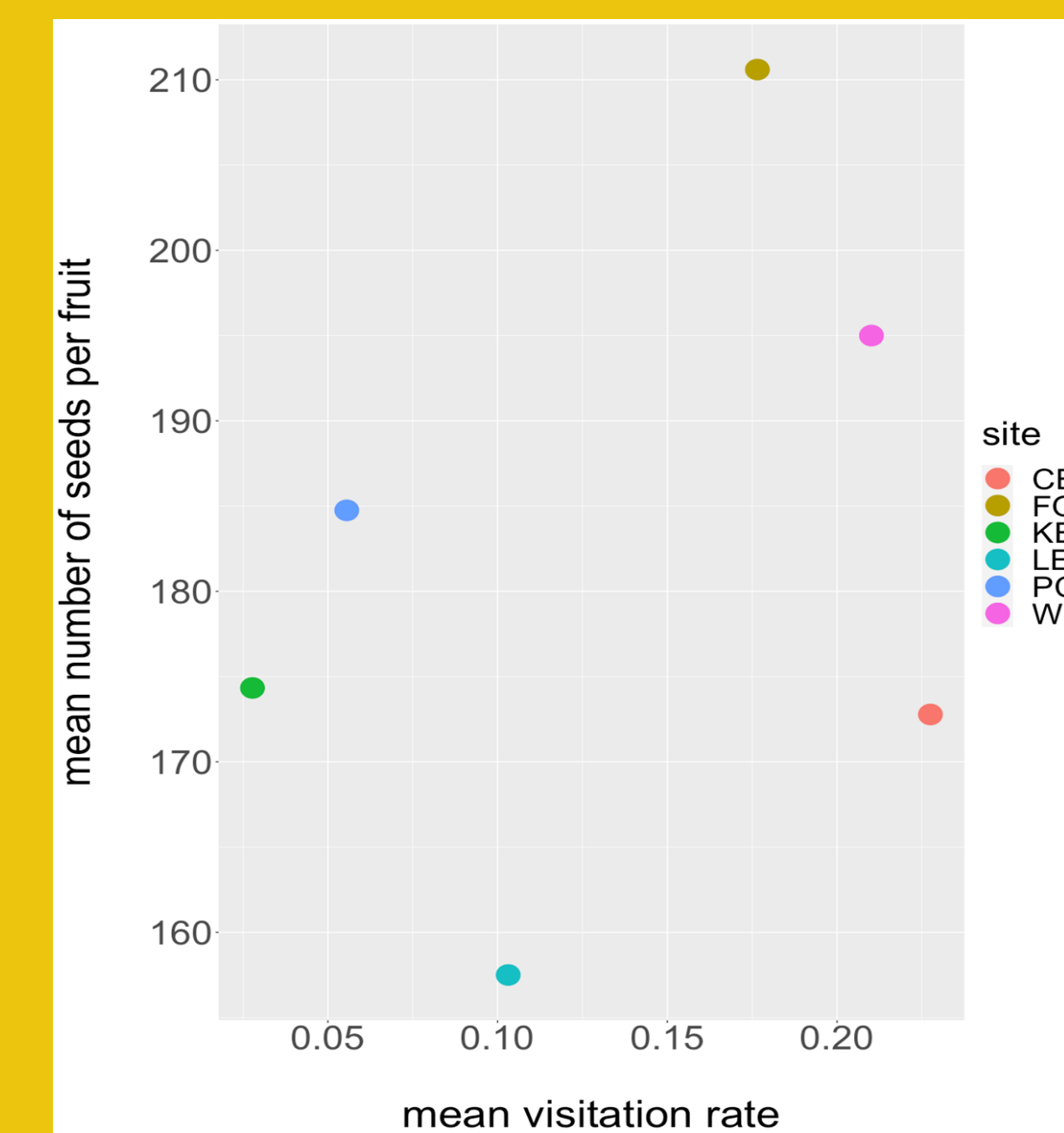


Fig 3. Rate of Pollinator Visitation Versus The Average Seed Set of Fruits

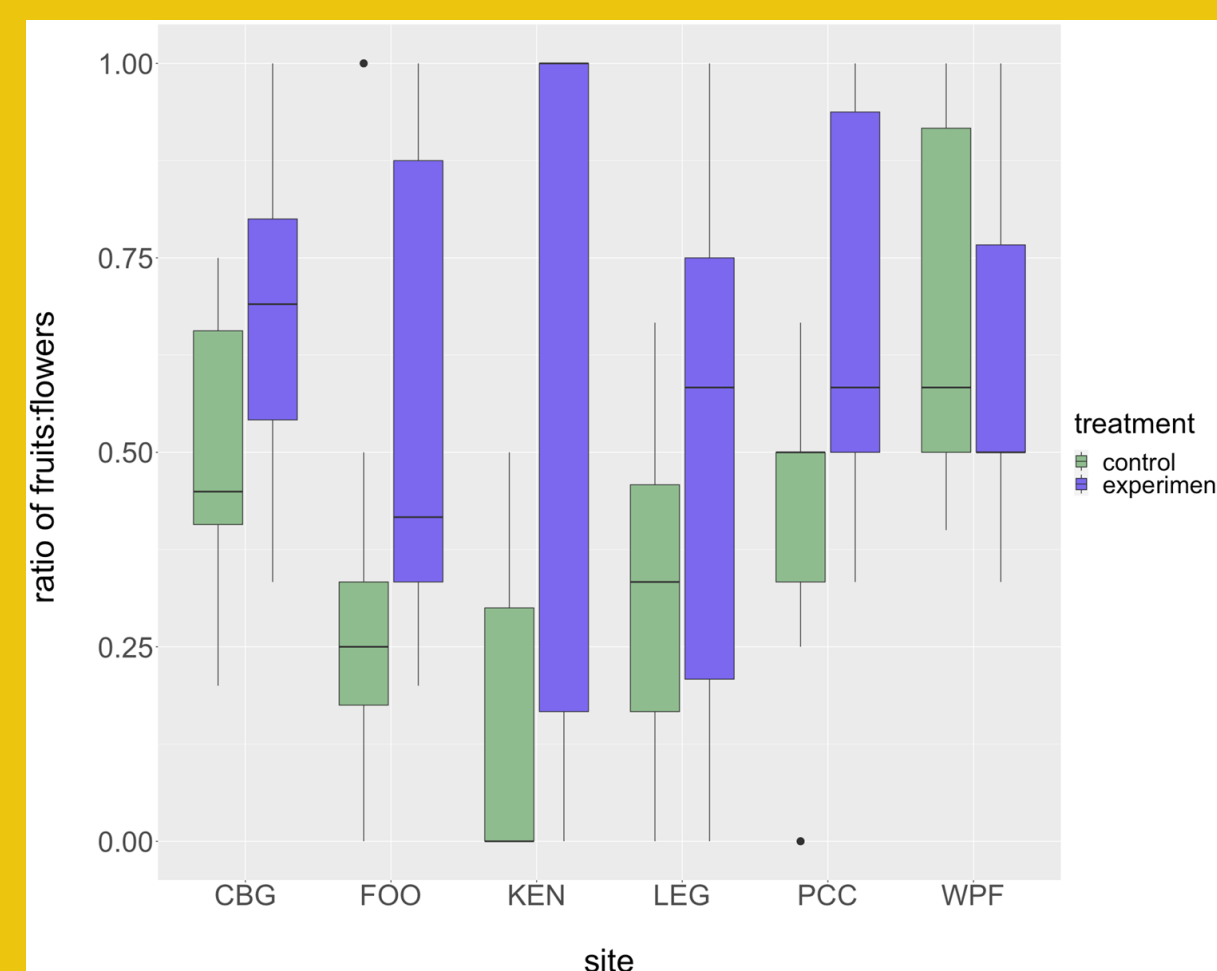
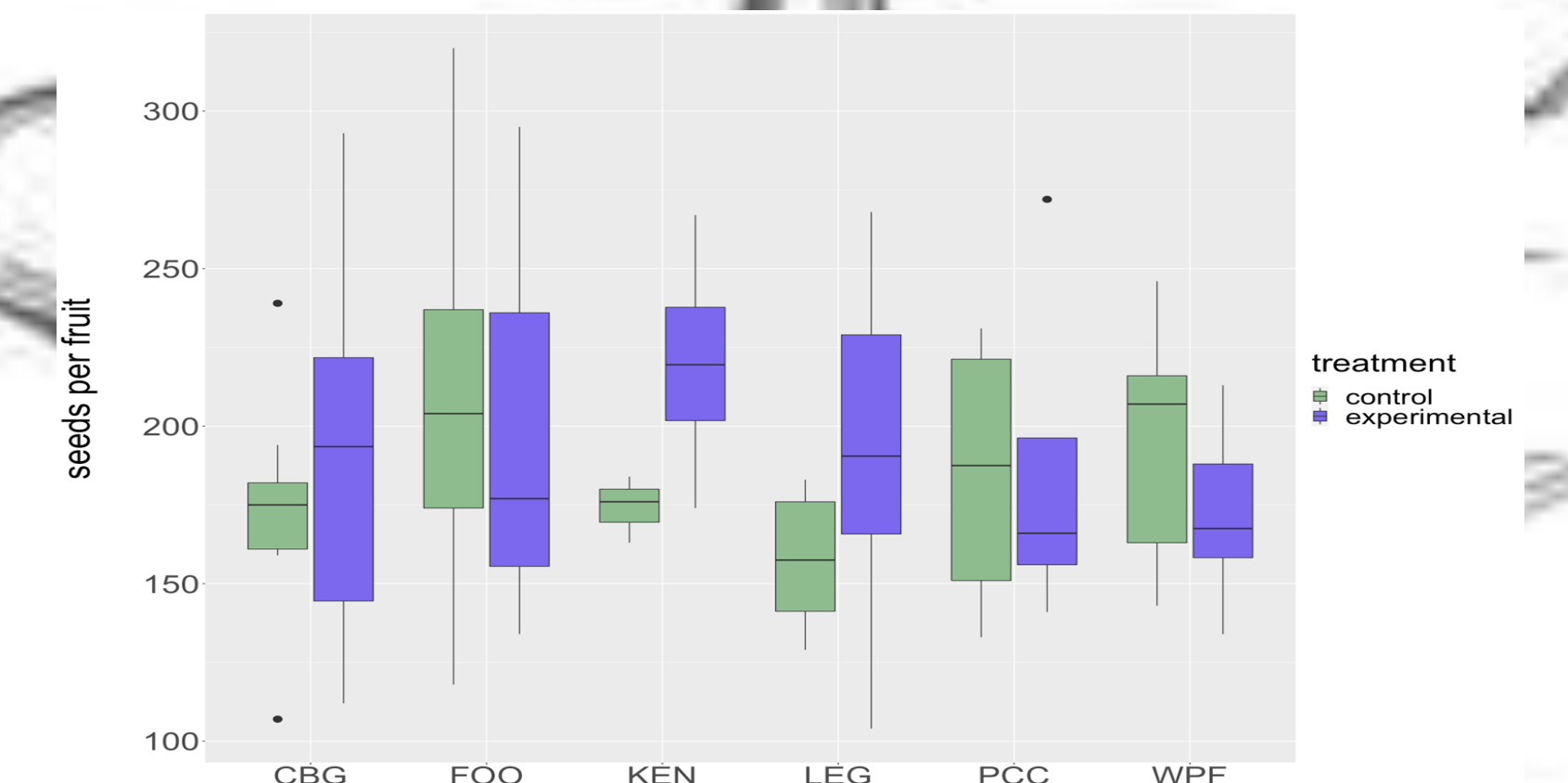


Fig 4. The Effect of Treatment And/Or Sites On The Fruit/Flower Ratio

- No significant trend between pollinator visitation and the number of flowers that become fruits ( $p = 0.122$ )
- No relationship between pollinator visitation and seed set ( $p = 0.4995$ )
- Both site ( $p = 0.023$ ) and treatment ( $p < 0.01$ ) had significant effects on the flower to fruit ratio
- Treatment ( $p = 0.38$ ) and site ( $p = 0.67$ ) did not appear to influence the number of seeds per fruit

Fig 5. The Effect Of Treatment And/Or Sites On The Seed Set Per Fruit



	Degrees freedom	Sum sq	Mean sq	F value	P value
Treatment	1	1872	1872	0.799	0.38
Site	5	7473	1494	0.638	0.67
Treatment:site	5	7985	1597	0.682	0.64

## Discussion

Although there is not a significant trend between pollinator visitation and the number of flowers fruited, our low p-value of 0.122 could suggest that a larger data set may show a significant difference.

The effects that treatment ( $p < .01$ ) and site ( $p = 0.023$ ) have on the fruit/flower ratio are both significant, suggesting that greater visitation would increase yields.

- As urban areas expand, it is important that we understand the factors that impact crop yield in these areas
- Being able to mitigate the effects of urbanization on pollinators could potentially lead to greater food source outcomes in urban areas
- Future research includes gathering more data, a larger sample size, and more frequent visits to the sites.

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## References

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