

Introduction

Plants compete for water and light and their survival is dependent on these resources.¹

How much sunlight a plant receives depends on how symmetrical its leaves are compared to the other plants. In lower densities the competition for light could be symmetric while in higher populations it could be asymmetric.²

Competition is generally understood to refer to the negative effects caused by the presence of neighbors, usually by reducing the availability of resources.³

Competition can have an effect on herbivory of plants that would have a major effect on plant defense.⁴

Plants that are larger than others can outcompete resources and cause smaller plants to die.⁵

Hypothesis: A single plant facing no competition will yield more biomass than plants facing intraspecific competition.

Materials

For this experiment we used wheat, plastic pots, wheat seeds and fertilizer.

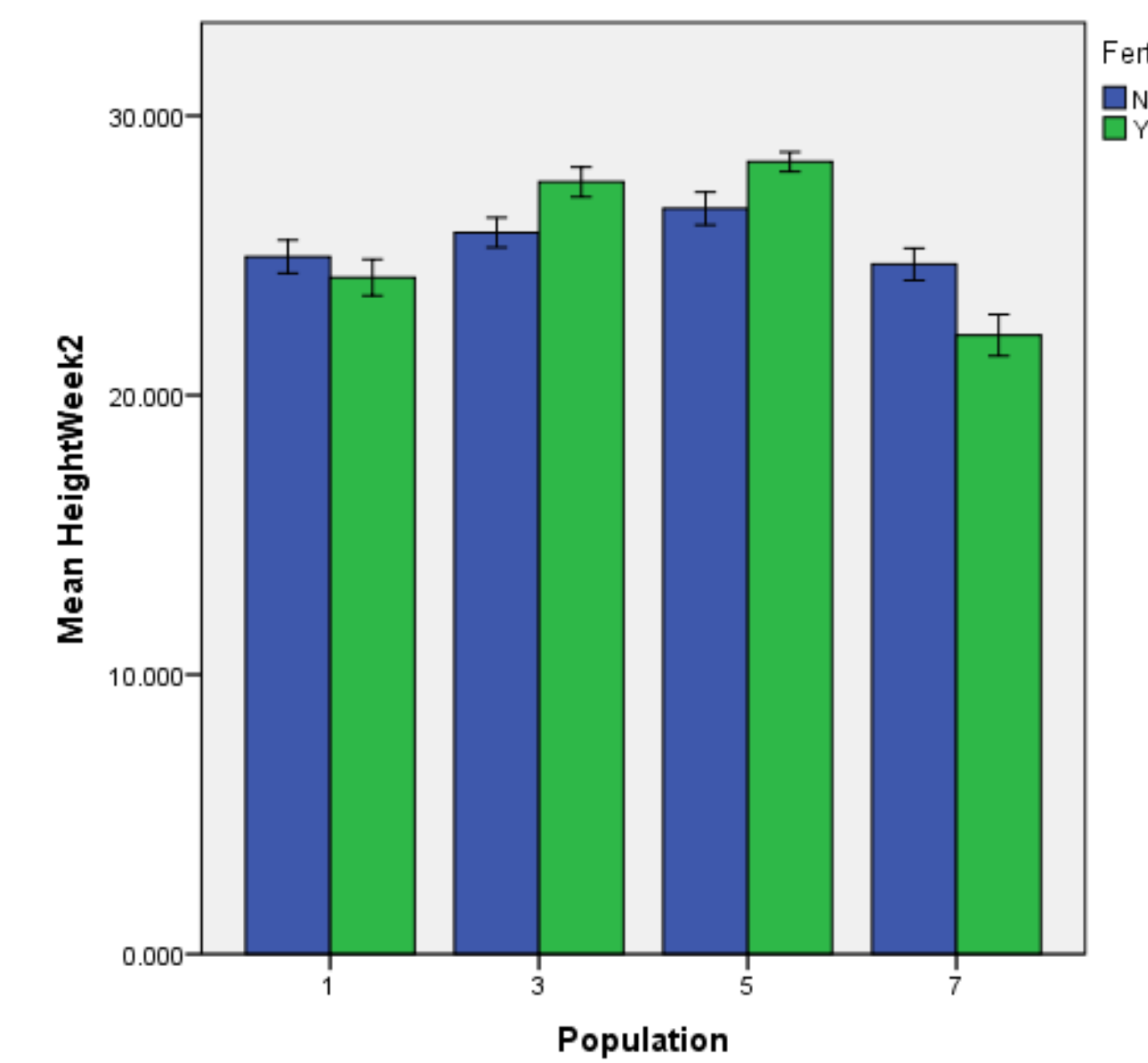
Methods

- Independent Variables: Fertilization, Population Size
- Dependent Variables: Height, Biomass
- Consistent planting depth of an inch and a half deep.
- Each plant received same amount of water and light over course of experiment.
- Half of the experiment was given fertilizer while the other half was not given additional fertilizer.
- Each week population and plant height were taken.
- To gather data we measured final plant height, number of leaves and total biomass.
- The total biomass was measured by cutting the wheat at ground level and weighing in grams on a scale.

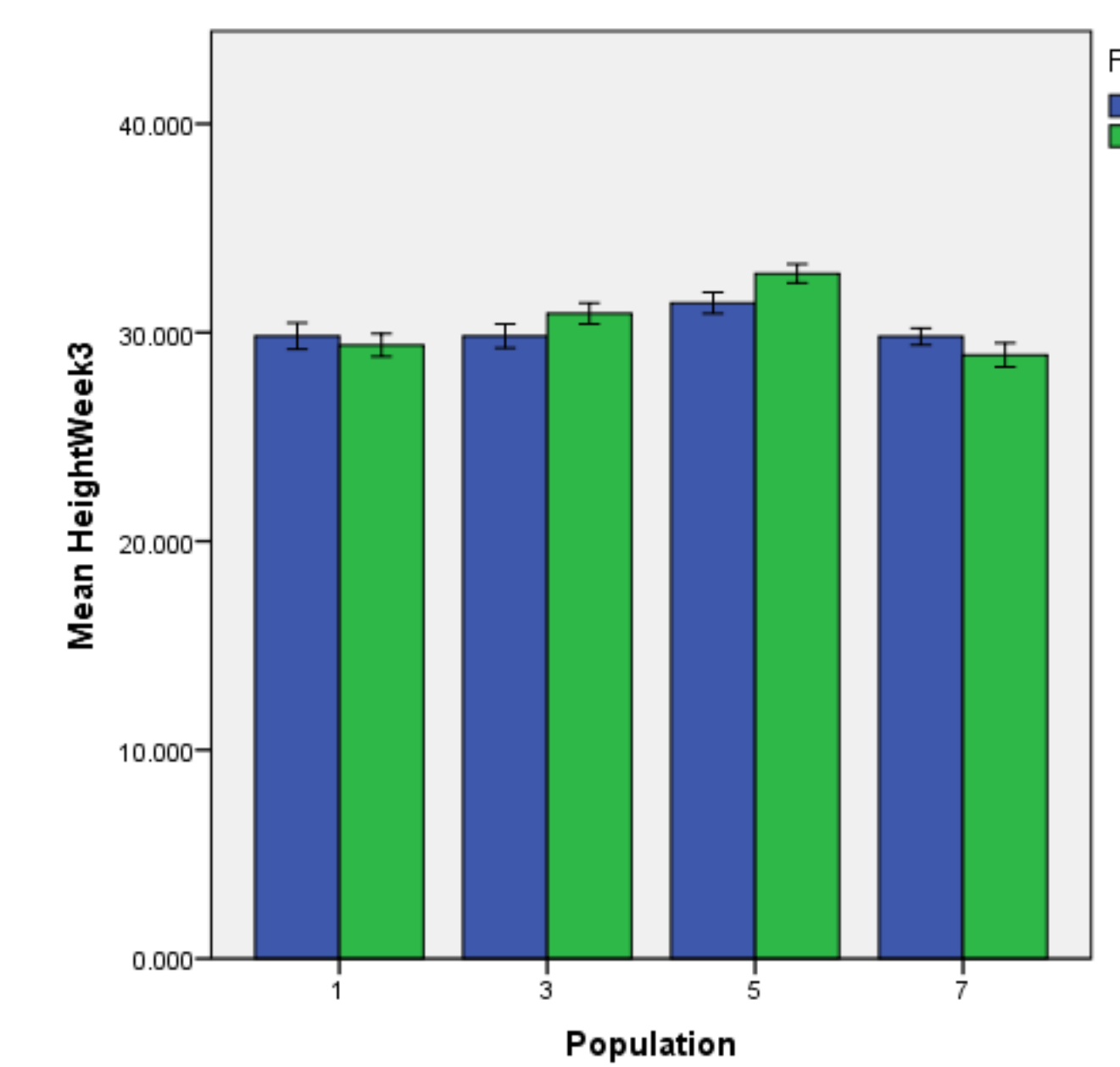


Results

Plant Height

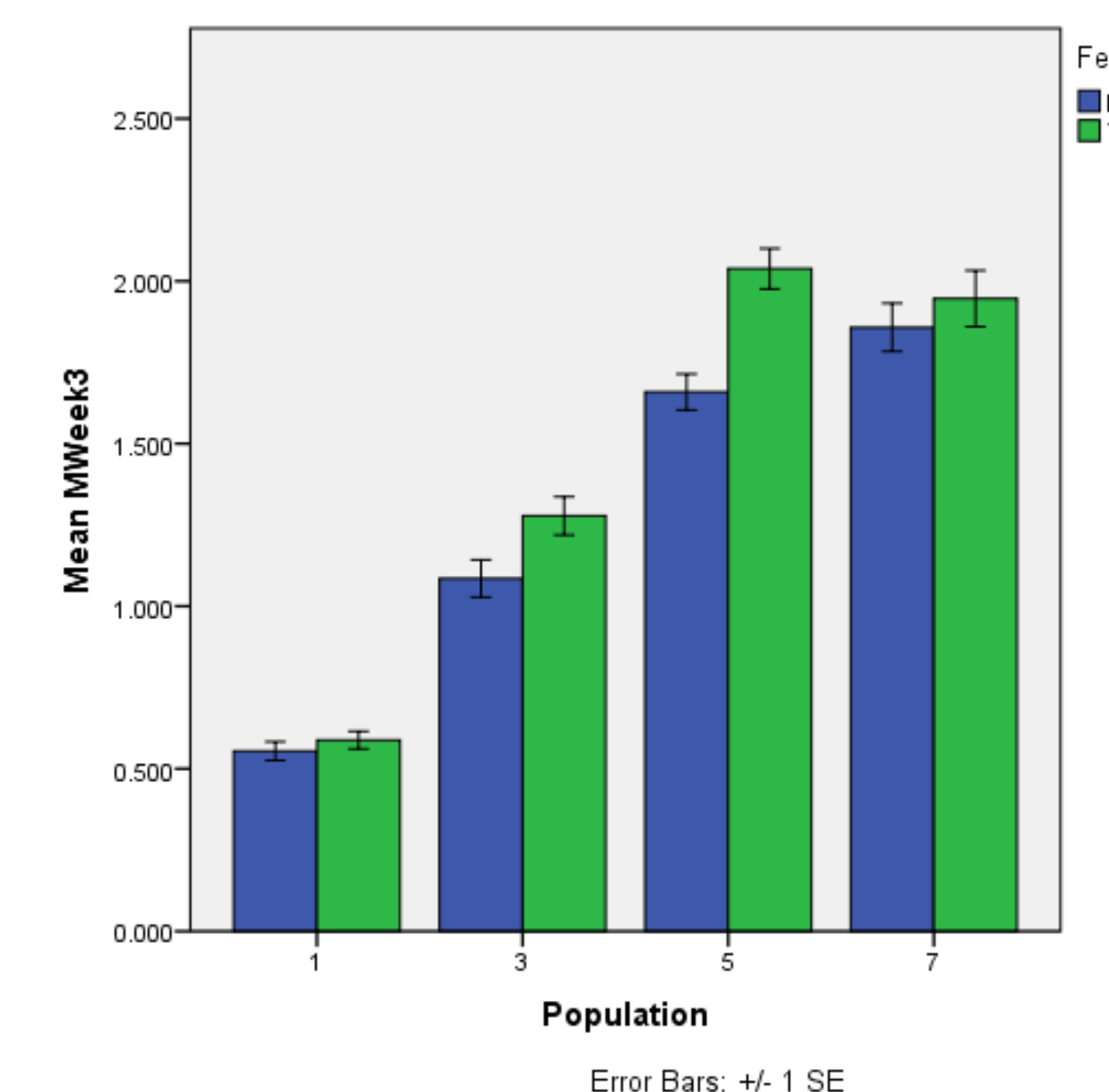


The mean height between each population was significantly different. ($P=.00033$ which is less than $P=.05$) However the difference in fertilized and non fertilized was not significant.

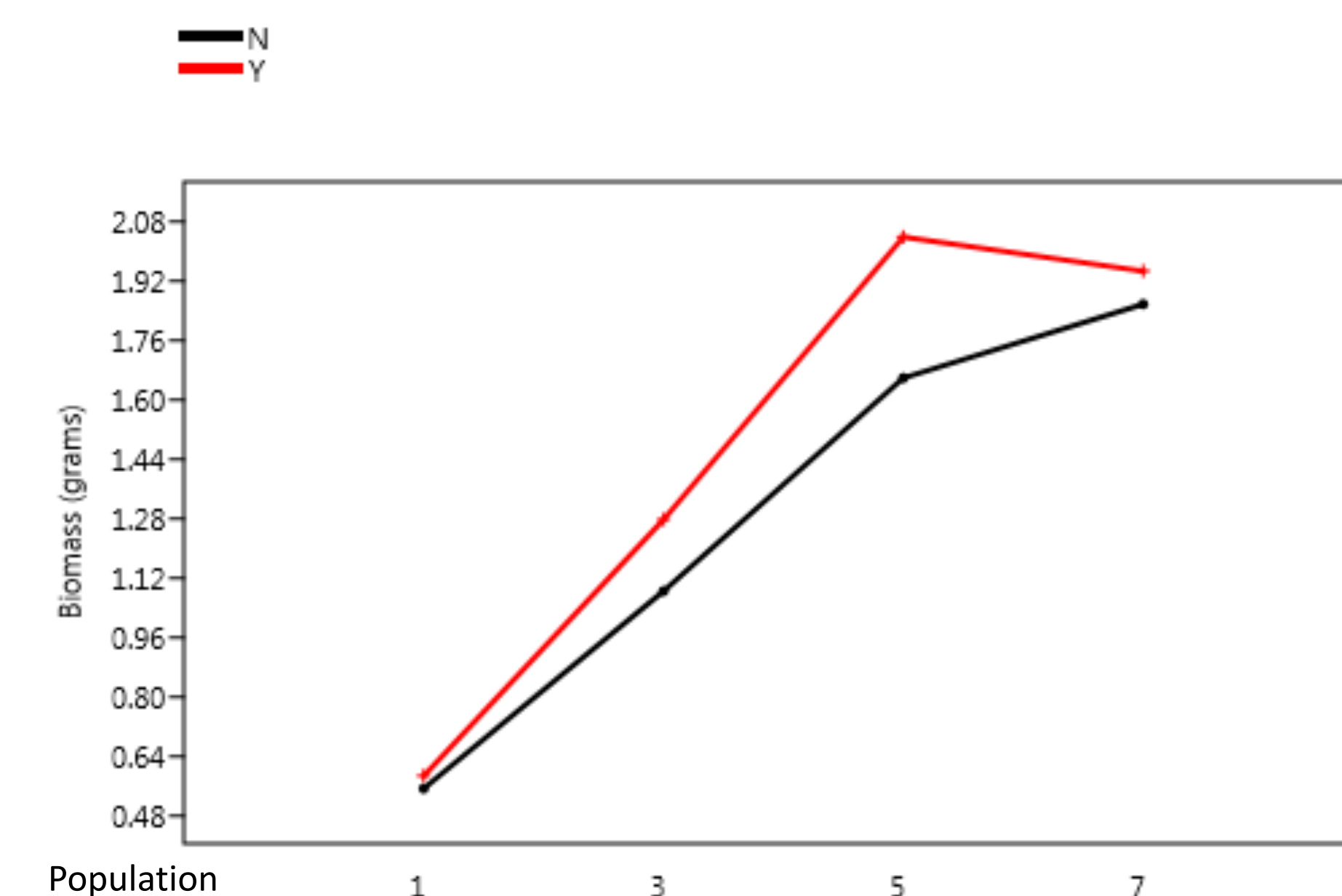


The mean height between each population was not significantly different. ($P=.085$ which is greater than $P=.05$) There was no significant difference between population heights or fertilized versus unfertilized.

Plant Biomass



The mean biomass for each population was found to be significantly different in both areas of fertilization and population. ($P=.014$ which is less than $P=.05$)



Using a post hoc analysis we found that population 5 and population 7 were not significantly different from each other. However all the others were significantly different from each other. Population 5 reaches carrying capacity for the pot and there is a negative biomass affect incurred with greater density than 5 plants per pot.

Conclusion

- It was determined in this experiment that the carrying capacity was 5 wheat plants per pot.
- It can be concluded from the experiment that competition promotes growth while the plant are competing for light and resources, they grew faster and taller in pots with higher population.
- The addition of fertilizer did not have a statistically significant difference between the two treatments.
- We suspect that the fertilizer would have shown more results in a longer experiment.
- In conclusion, population and the addition of fertilizer promoted plant biomass growth until the population reached 7, at that point biomass decreased regardless of the addition of fertilizer.

Acknowledgements

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