

Investigation of light availability and disturbance on the population spatial structure of the invasive plant

Microstegium vimineum along the Wilson Trail, Hampden Sydney, VA

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Background

- *Microstegium vimineum* was recognized as an invasive species in the 1980s. It has spread to nearly all eastern States and has negatively impacted ecosystem functions^{1,2}.
- *M. vimineum* has the ability to produce 59% and 33% more biomass compared to other native species in sunny and shady environments³.
- *M. vimineum* growth is increased in areas that have high soil moisture, and increased light¹.



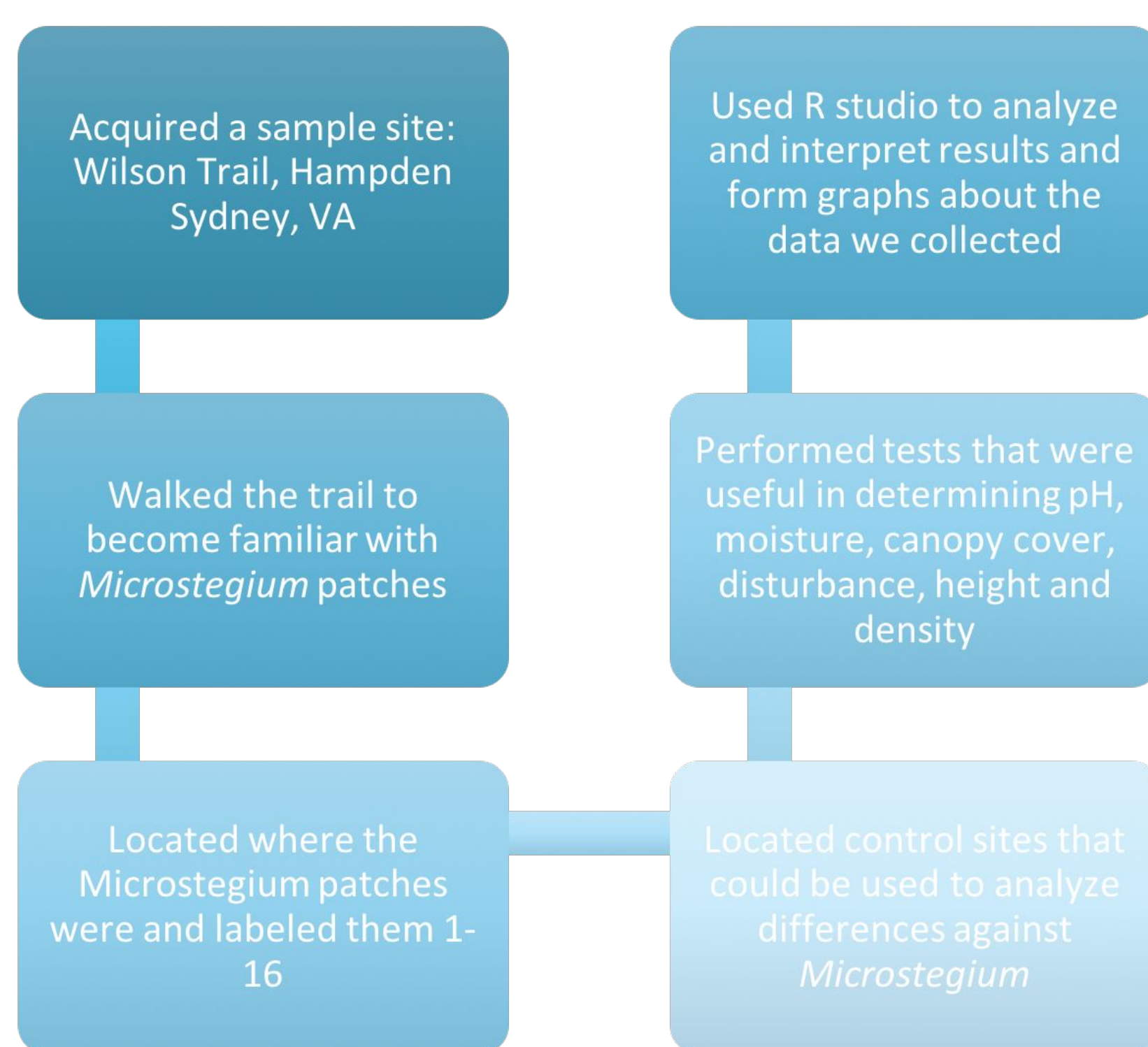
Figure 6. Image of *Microstegium vimineum*.

Specific Aim

Research Question: What patch characteristics are associated with *Microstegium vimineum* abundance?

Hypothesis: *M. vimineum* abundance will be greater in patches with increased light availability, increased disturbance, decreased soil moisture, and increased nutrient availability.

Methods



Conclusions

- Where *M. vimineum* is present other plants are reduced.
- At this site most patches were small (<50 m²) and 20-40 cm high.
- There was almost no variation in environmental conditions at the site, so our original hypothesis was not tested.
- Evaluation of the effect of environmental conditions would require a site with more variation.

References

1. Cole, G., P., Weltzin J., F. (2004). Environmental correlates of the distribution and abundance of *microstegium vimineum*, in east Tennessee. *Southeastern Naturalist* 3(3) 545-562.
2. McGrath, A., D., Binkley, M., A. (2009). *Microstegium vimineum* invasion changes soil chemistry and microarthropod communities in cumberland plateau forests. *Southeastern Naturalist* 8(1) 141-156.
3. Flory, L., S., Long, F., Clay, K. (2011). Invasive "*Microstegium*" populations consistently outperform native range populations across diverse environments. *Ecological Society of America*. 92(12) 2248-2257.

Results

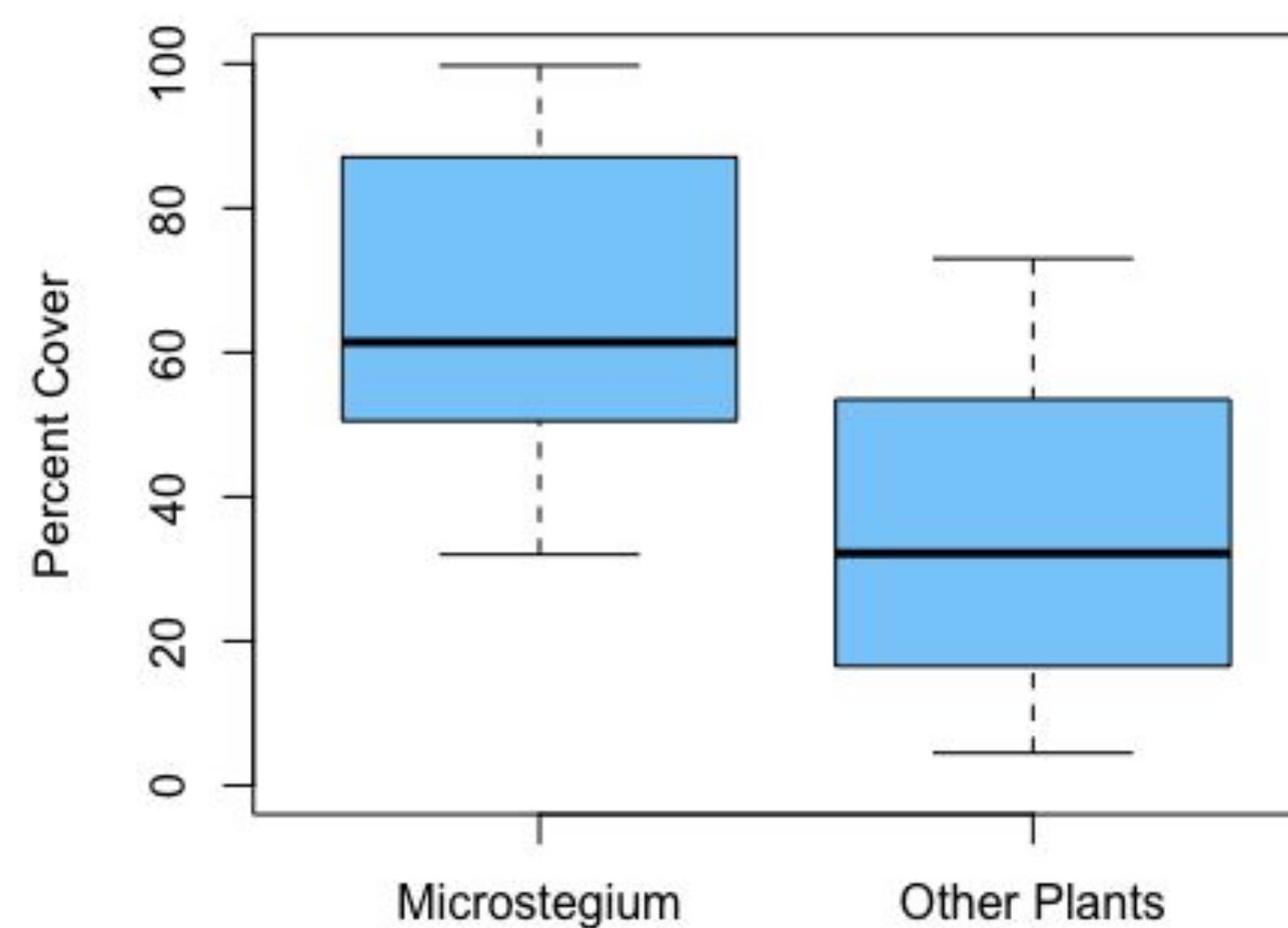


Figure 1: **Density within *M. vimineum* patches on the Wilson Trail.** *M. vimineum* density was significantly greater than other plants within a patch of *M. vimineum*. This suggests that *M. vimineum* replaced the other plants during the invasion.

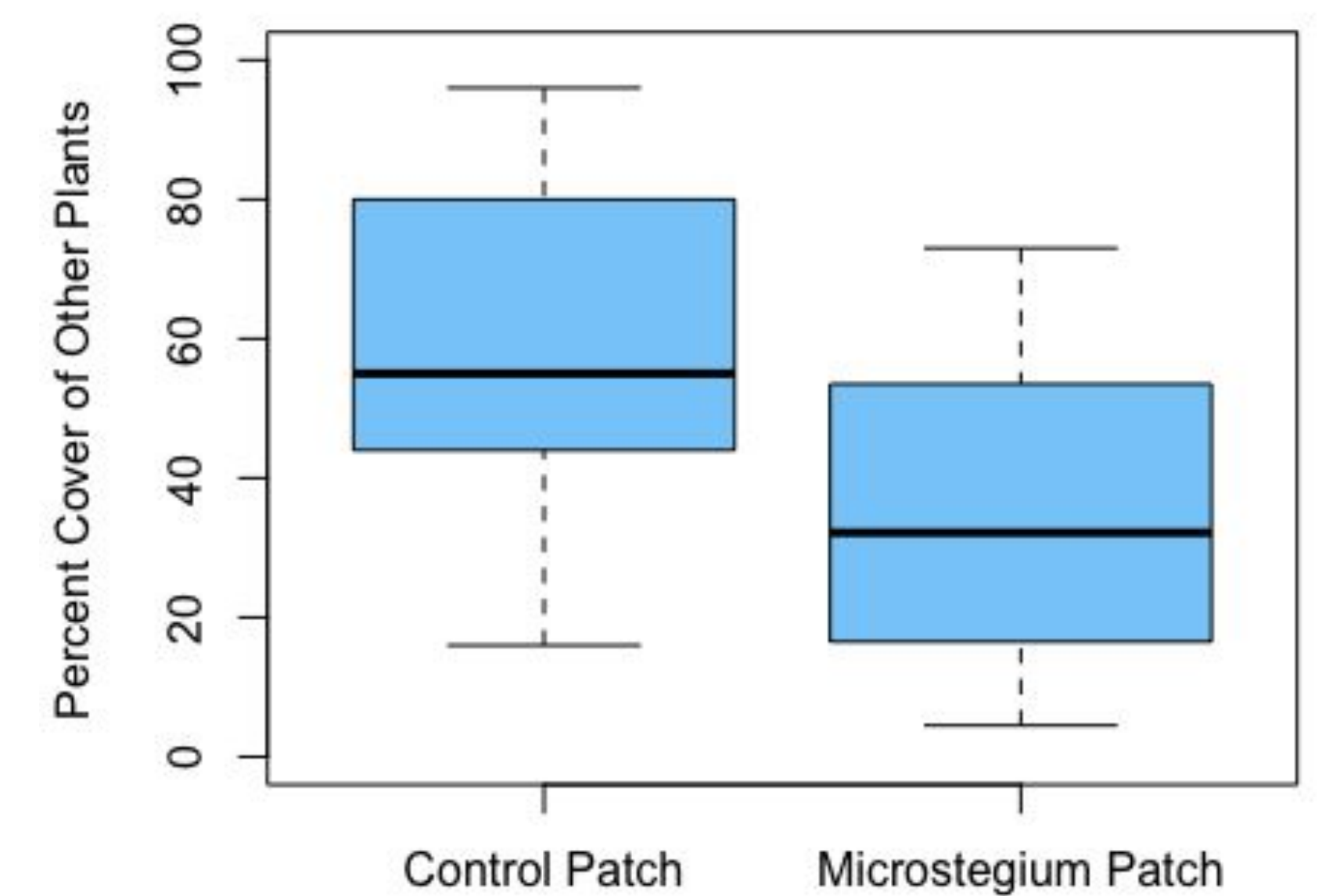


Figure 2: **Other plant densities between *M. vimineum* and non-*M. vimineum* patches.** There was a significantly higher density of other plants outside of *M. vimineum* patches. Therefore, there was a lower density of other plants in *M. vimineum* patches.

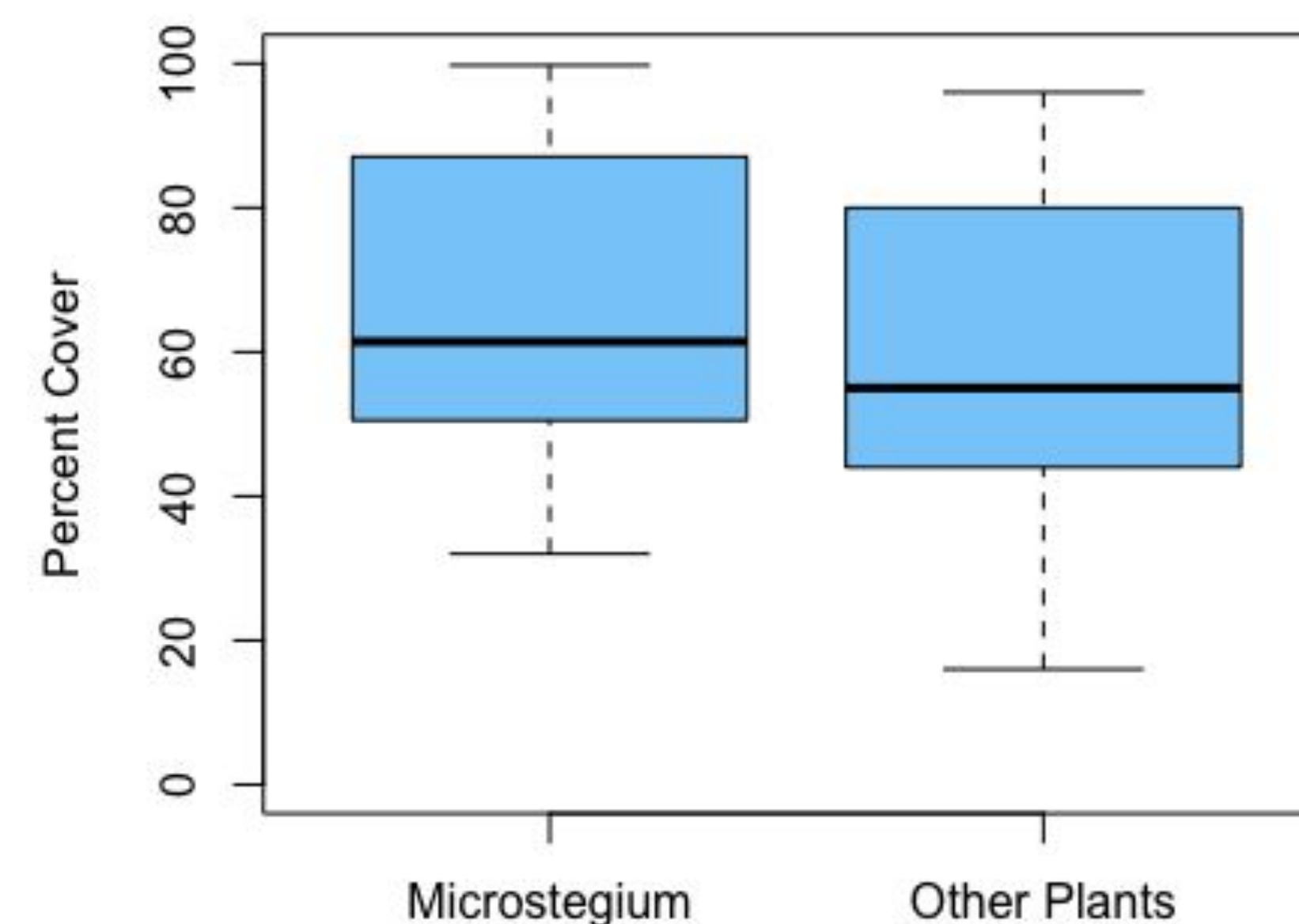


Figure 3: **The comparison of *M. vimineum* density to the Control density.** There was no significant difference in density between other plants outside of a *M. vimineum* patch and *M. vimineum* within a *M. vimineum* patch.

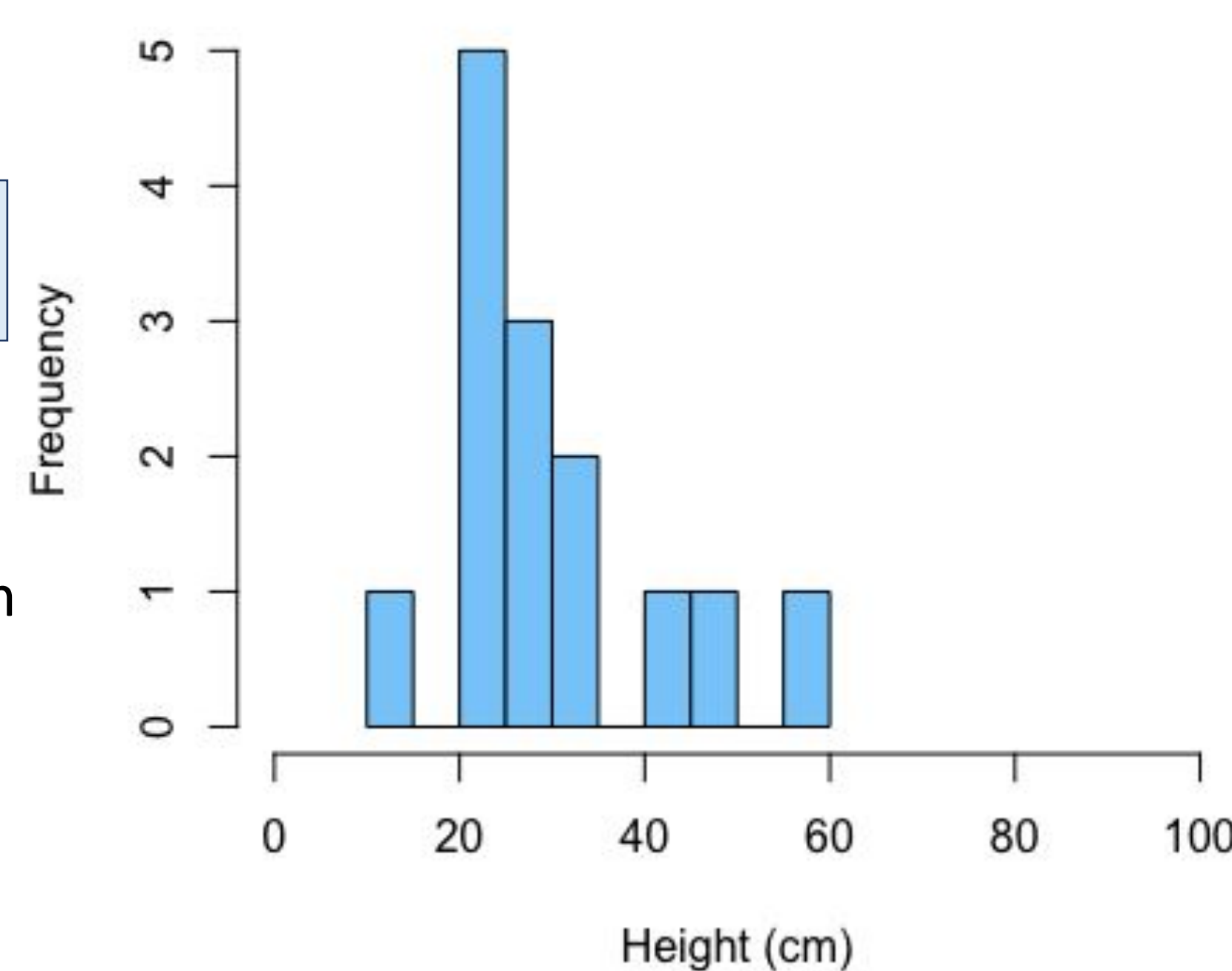


Figure 4: **Frequency Histogram of *M. vimineum* height.** There was not a lot of variation between patch height. The most frequent heights were between 20 and 40 cm.

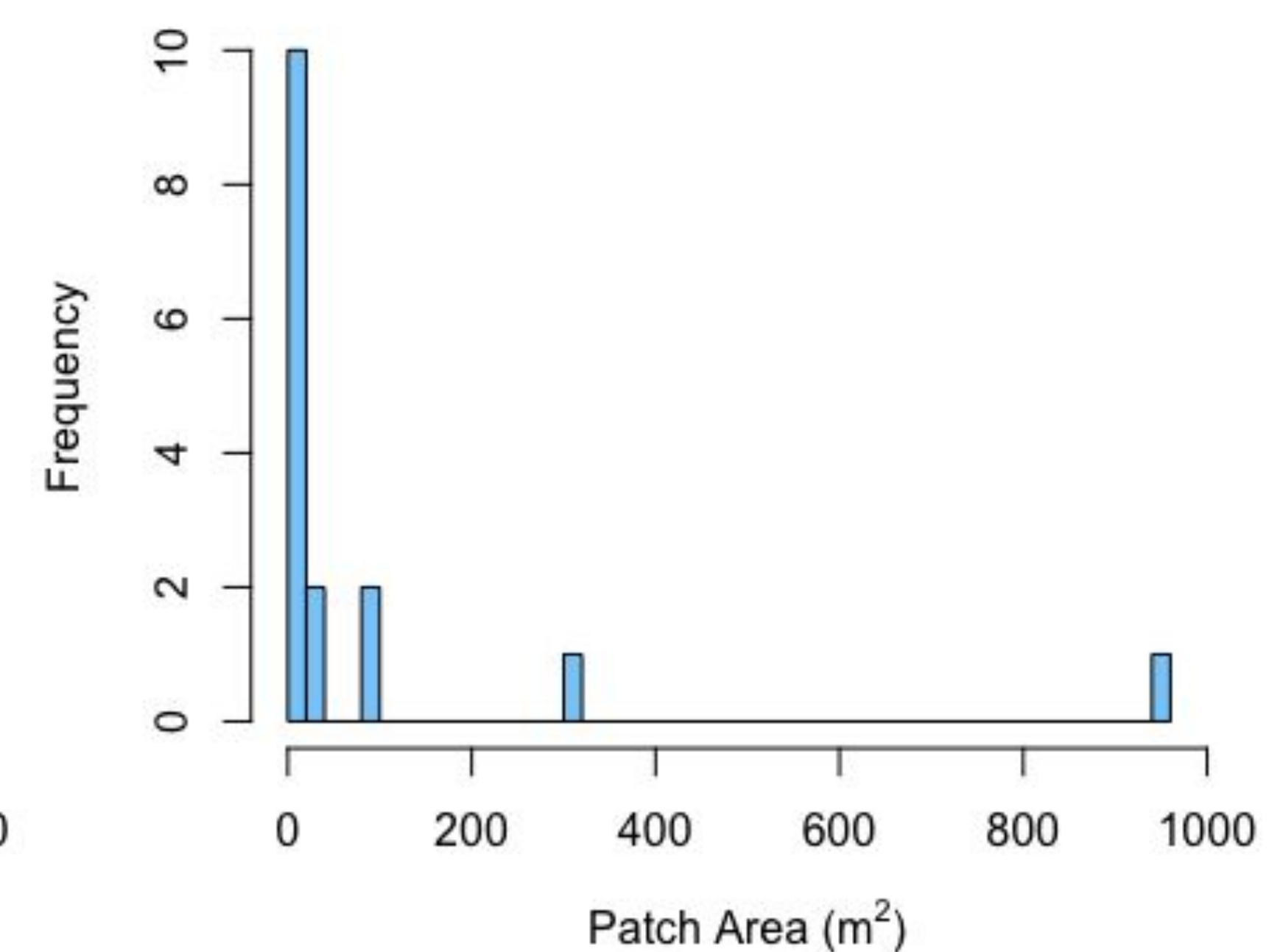


Figure 5: **Frequency Histogram of *M. vimineum* Area.** The population was dominated by small patches. Virtually, all patches were below 50 m².