

Background

- Native ground-nesting bees are the primary pollinators in the tallgrass prairie of western Minnesota. Studies suggest that these bees may find sandy, less dense soils easier to build nests in.
- To determine the nesting habitats of ground-nesting bees and the variation across the sampling area, soil was collected from 8 sites in western Minnesota part of The Echinacea Project.
- Each sample was analyzed to determine their percentages of sand, silt, and clay using the micropipette soil analysis.
- Overall, this project looks at the soil variation between sites, land uses, and where bees are found.

Questions

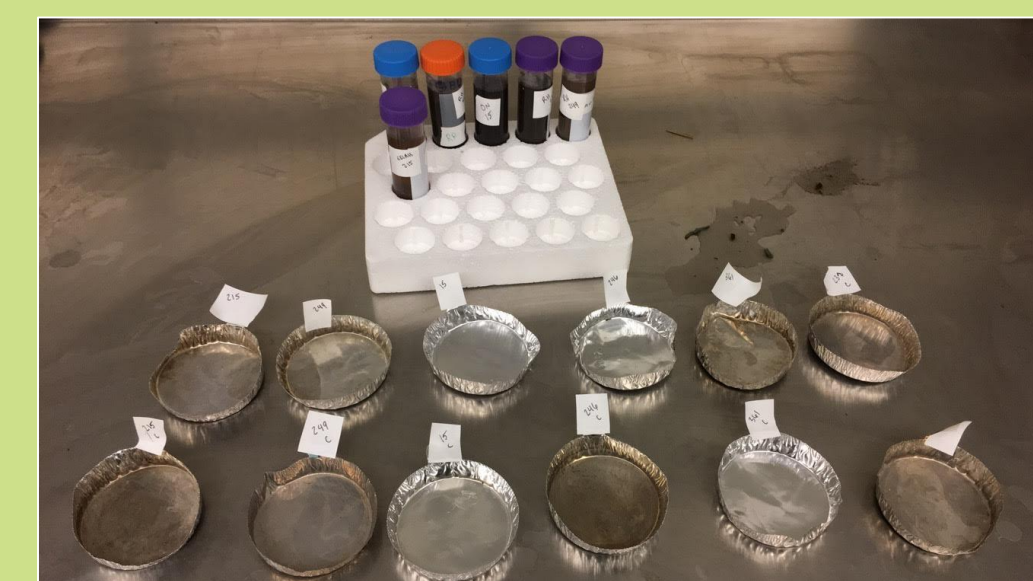
- Does the soil texture differ between bee presence and absence?
- Does soil differ between sites and land use?

Methods

- 8 sites with 3 land types per site (old field, remnant prairie, and restoration), each had 60 random points.
- 10 soil samples collected from each land use at each site plus any additional points where a bee was captured
- Micropipette soil textural analysis

To calculate the percentages of sand, silt, and clay the following equations were used:

- 1) Calculate the % sand = $(\text{sand wt} / \text{total wt}) * 100$
- 2) Calculate the % silt + clay = $100 - \% \text{ sand}$
- 3) Calculate % clay = $\text{clay wt} * \% \text{ silt} + \text{clay}$
- 4) Calculate % silt = $100 - \% \text{ sand} - \% \text{ clay}$



Results

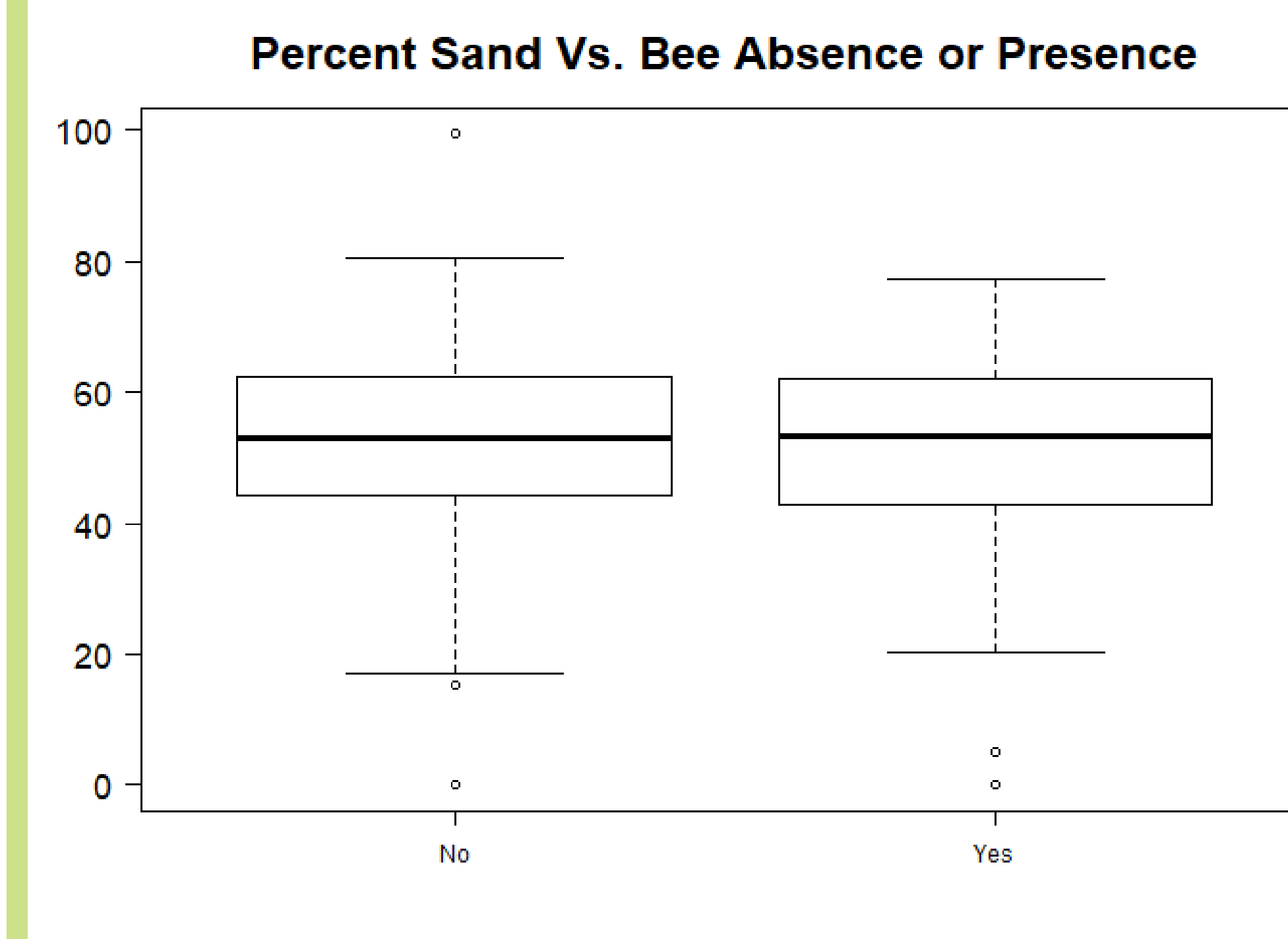


Figure 1. Percent sand where bees were found (1) versus where no bees were found (0).
Figure 2. Percent silt where bees were found.

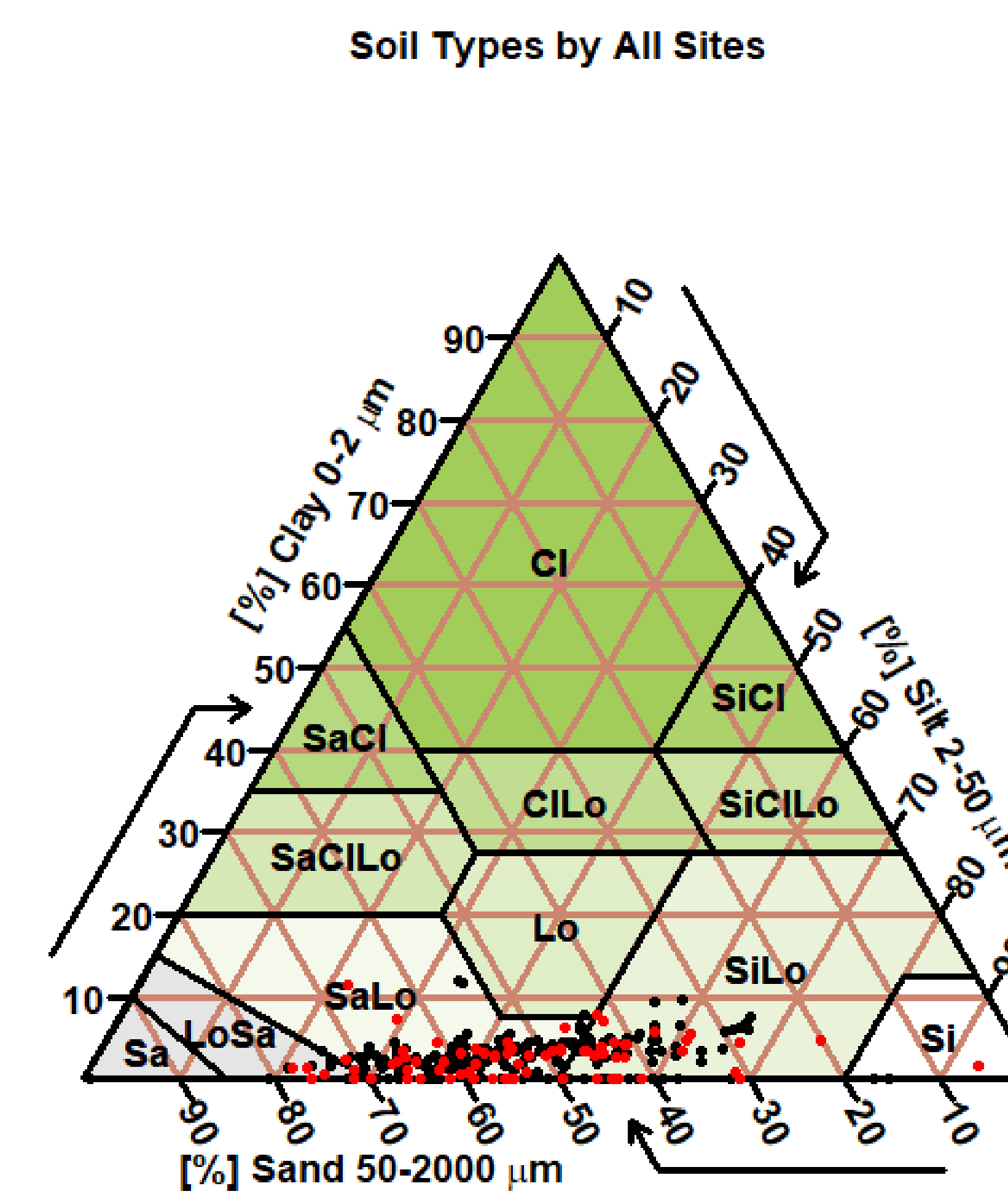
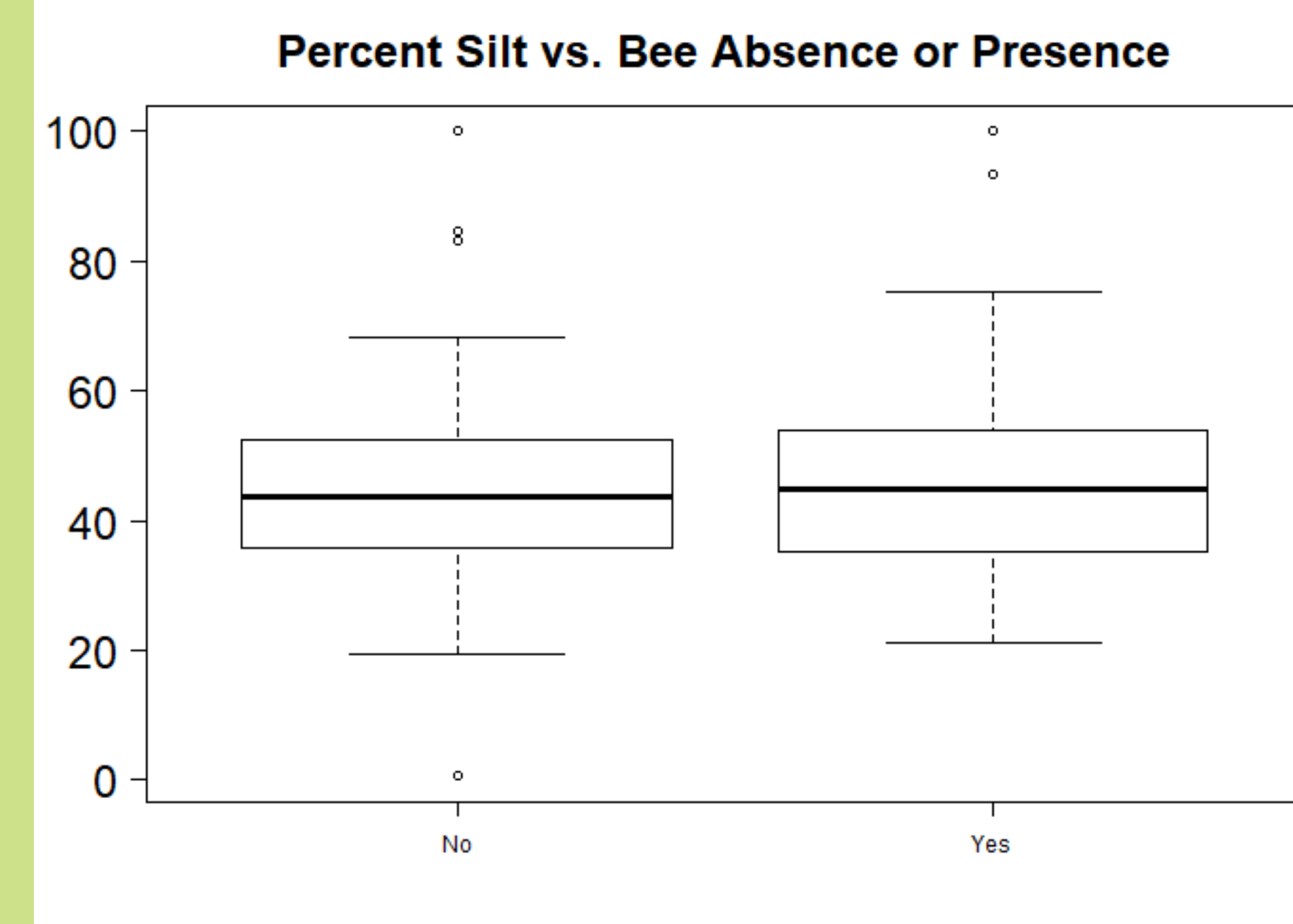


Figure 3. Soil triangle with colors indicating different types. Red dots mark samples where bees were found



Hegg Lake, Minnesota, one of 8 sampling locations

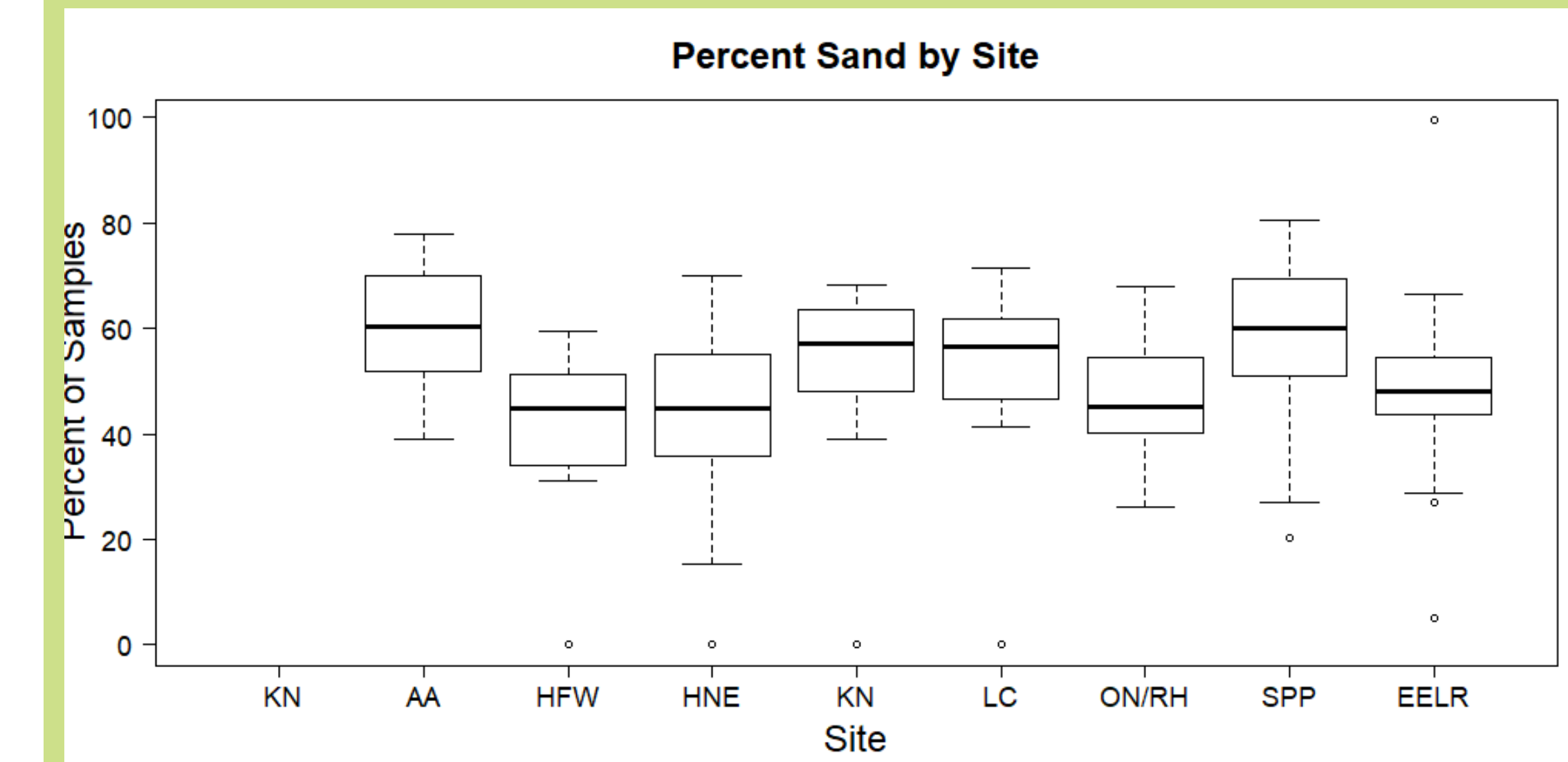
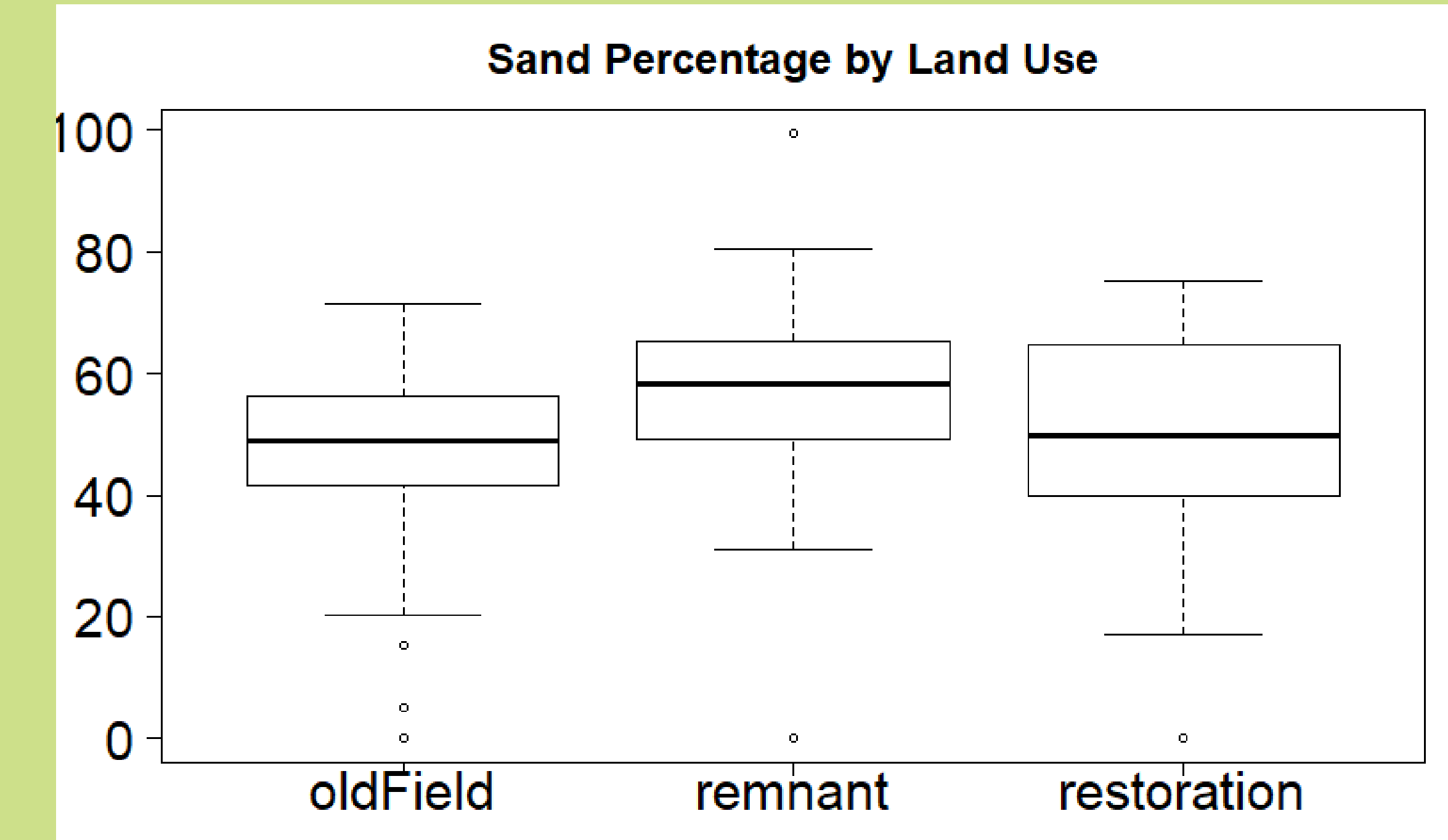


Figure 4. Percentage of sand across all sites.
Figure 5. Percentage of sand across the three land uses.



Discussion and Conclusion

- There is evidence that most samples contain higher percentages of sand and silt compared to clay. Placing them in the sandy loam, silty loam, or loamy sand categories.
- The results do not suggest that sand percentage has a high influence on ground-nesting bee habits. Figure 2 shows that little to no variation exists among the percentages of sand or silt.
- Differences in sand and silt account for the variation seen across the 8 sites and land uses.
- Remnant prairies tend to have slightly higher percentages of sand

References

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- O'Toole, C., & Raw, A. (1991). Bees of the World. Blandford Press.
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