

Introduction and Objectives

Urban landscapes in arid areas frequently incorporate turfgrass rather than arid-adapted species. In addition to higher water and nutrient requirements, grassy lawns may alter the function of urban ecosystems. The ASU Poly campus supports extensive turf lawns. Small areas, including the ASU Poly arboretum, are planted largely with native species. Such areas require smaller amounts of water and nutrients, and limited maintenance. As part of a larger project exploring improved sustainability practices of the ASU landscape, we asked how landscape design affects a suite of soil characteristics. Specifically, we asked, **do soil properties differ between managed lawns and more natural landscapes in the ASU Poly ecosystem?**

Methods

We collected soils from 28 experimental plots at the ASU Poly campus. Plots were categorized as either grassy “lawn” or desert-like “arboretum.” Soils were collected at a depth of 10cm into polyvinyl bags. In the lab, air-dried soils were passed through a 2mm sieve and subsequent analyses completed on the fine fraction. Analysis of water content, %fine fraction, loss on ignition, soil pH and soil texture followed published protocols (Bouzoukis, 1962, Lim et al., 1983, Mclean, 1983, Lyon & Sagers 1998). We determined the significance of pairwise comparisons for each analysis by Mann-Whitney U. To determine whether lawn and arboretum plots have overlapping soil traits, we performed a principal component analysis (PCA).

Figure 1 (right): In order left to right, K. Chauhan, S. Page, C. Waldum, A. Bowler.



Results

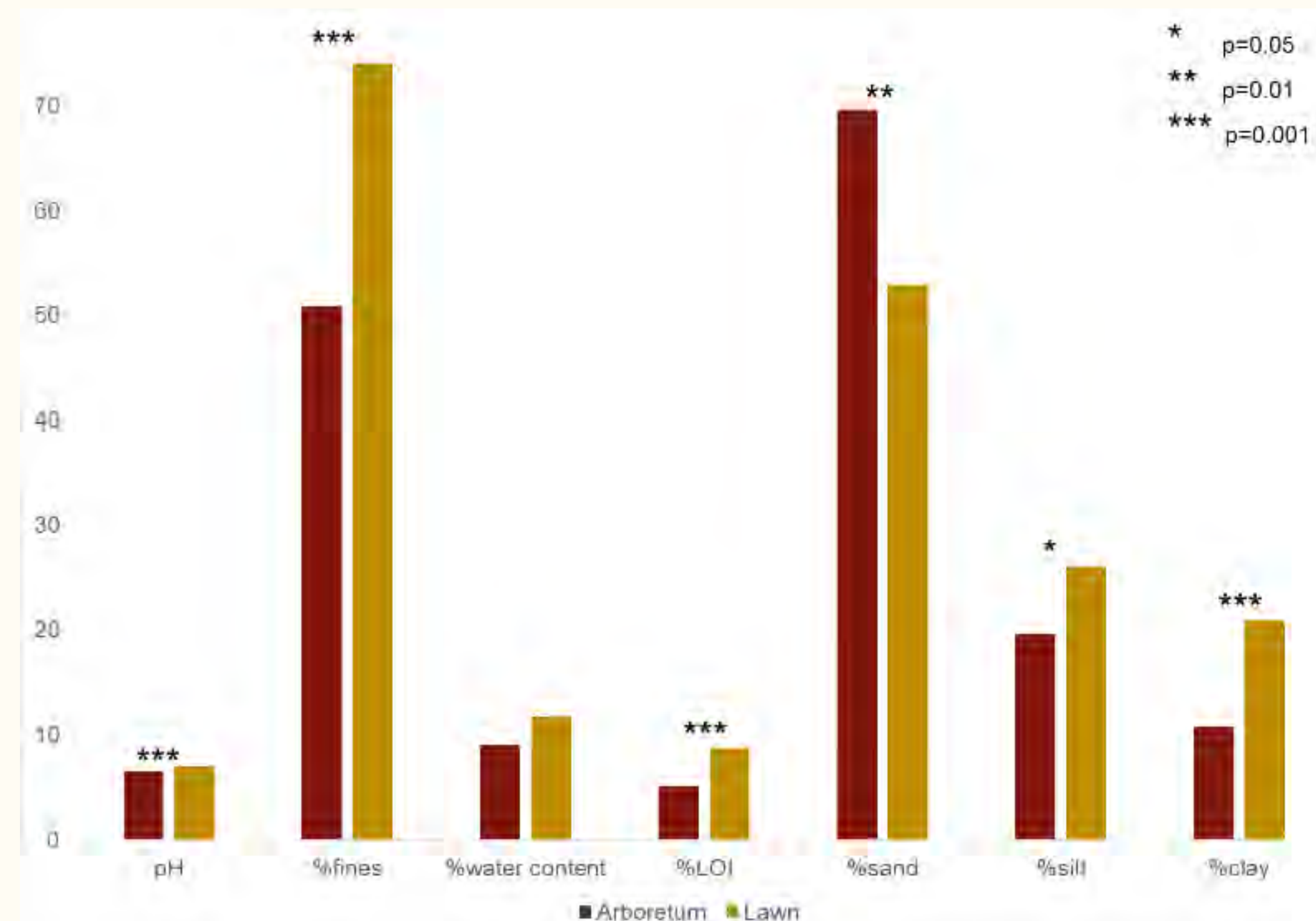
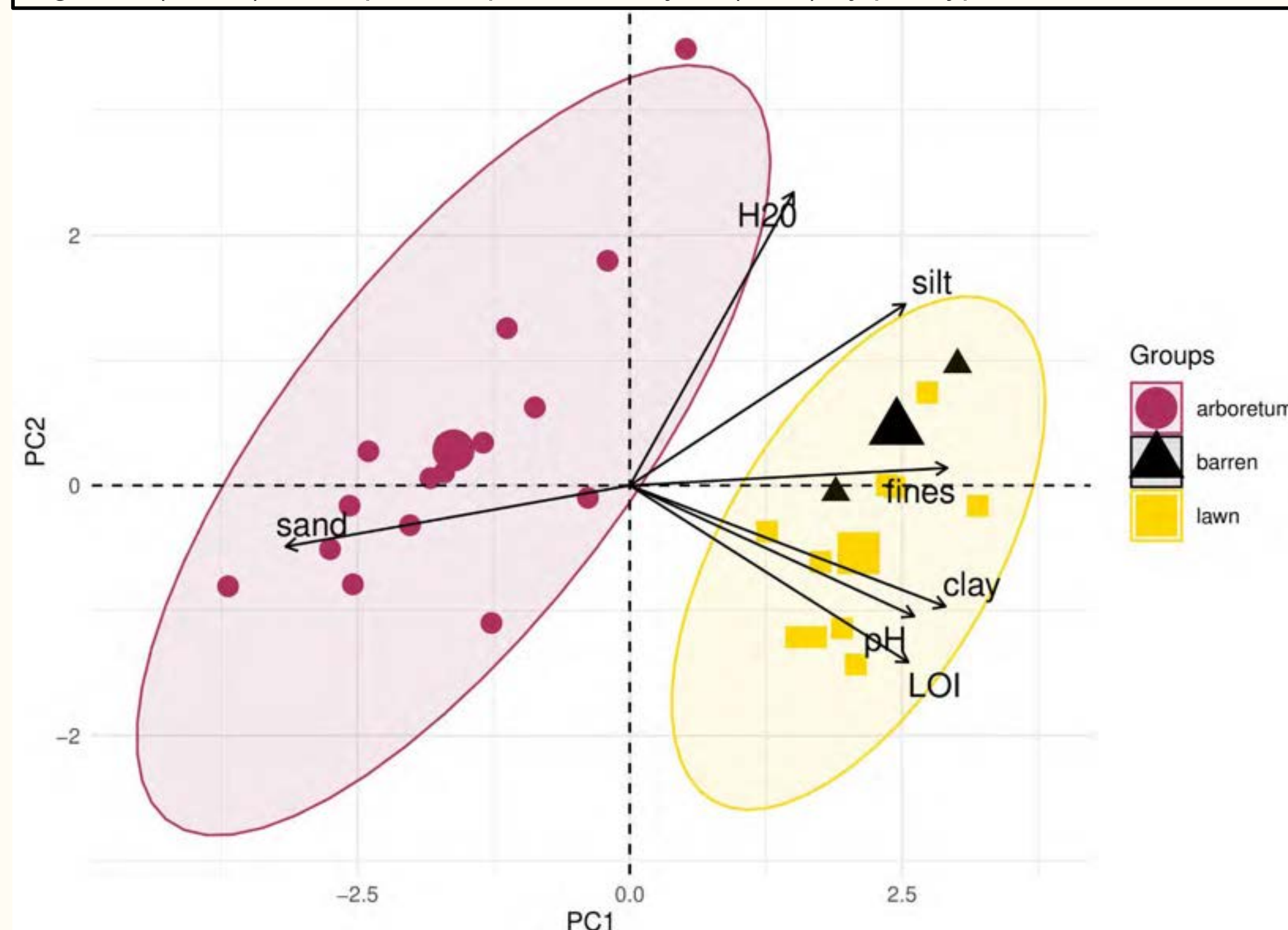


Figure 2 (above): Pairwise comparisons of soil properties of grass and arboretum plots. Figure 3 (below): Principal Component Analysis (PCA) by plot type.



Results

Management practices have a profound impact on soil properties. Of the seven soil properties measured, six differed significantly between lawn and arboretum plots (Fig. 2). Plot types segregated along axes 1 and 2 in multivariate space, with soil texture, loss on ignition, and water content contributing heavily to the separation (Fig. 3). Lawn soils had significantly less sand, likely the outcome of decades of irrigation.

Discussion & Conclusion

The profound differences in soil characteristics detected in this study have important implications. First, loss of sand in irrigated areas could lead to more compact soils. With the loss of sand, the compaction of soils may hinder future land uses, including a planned restoration on the ASU Poly campus. Secondly, differences in soil properties point to differences in soil function. Future research on carbon storage. Differences in soil properties gives rise to further research questions, such as whether the size of the microbial community within the soil differs with the varying soil properties, and whether a larger community of soil microbes will result in a greater emission of atmospheric carbon, as it is known that soil microbes release carbon into the atmosphere (Gougoulias et al, 2014).

Literature Cited & Acknowledgements

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