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# Comparison of Heavy Metals in Spinach Grown on the Roof Ground Location at Portland State University

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# Comparing heavy metal content found in spinach grown on the roof and ground level sites at Portland State University.



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## Introduction

As a result of urbanization fresh, healthy produce can be expensive and inaccessible to some. While finding local areas to grow crops are limited the utilizing normally unused roof tops for farming can offer a solution to these issues. Determining if growing leafy greens on roofs will result in less contamination could lead to larger-scale use.

The purpose of this study is to compare data from a previously unpublished study to find if growing leafy vegetables on roofs can limit heavy metal exposure.

## Materials and Methods

10 Spinach beds with temperature sensors were placed at each of the 10 locations. These beds were watered once a week unless it rained, monitored with picture and height measurements. After 7 weeks of growing the samples were harvested and the spinach leaves were separated from the roots and weighed and heavy metals extracted by Inductively coupled plasma - optical emission spectrometry (ICP-OES).

## Results

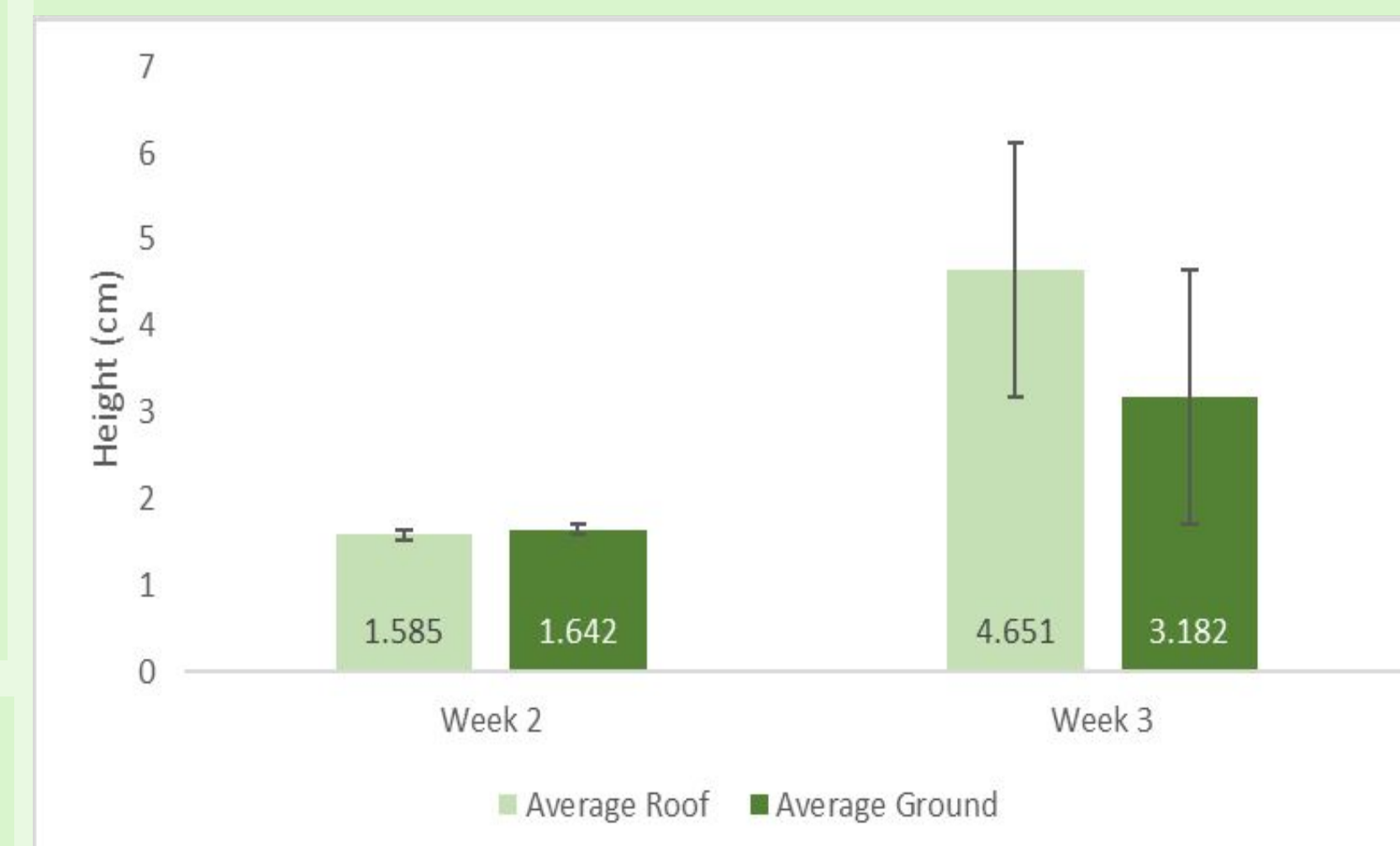


Figure 1, Cotyledon heights on roof vs ground over week two and three

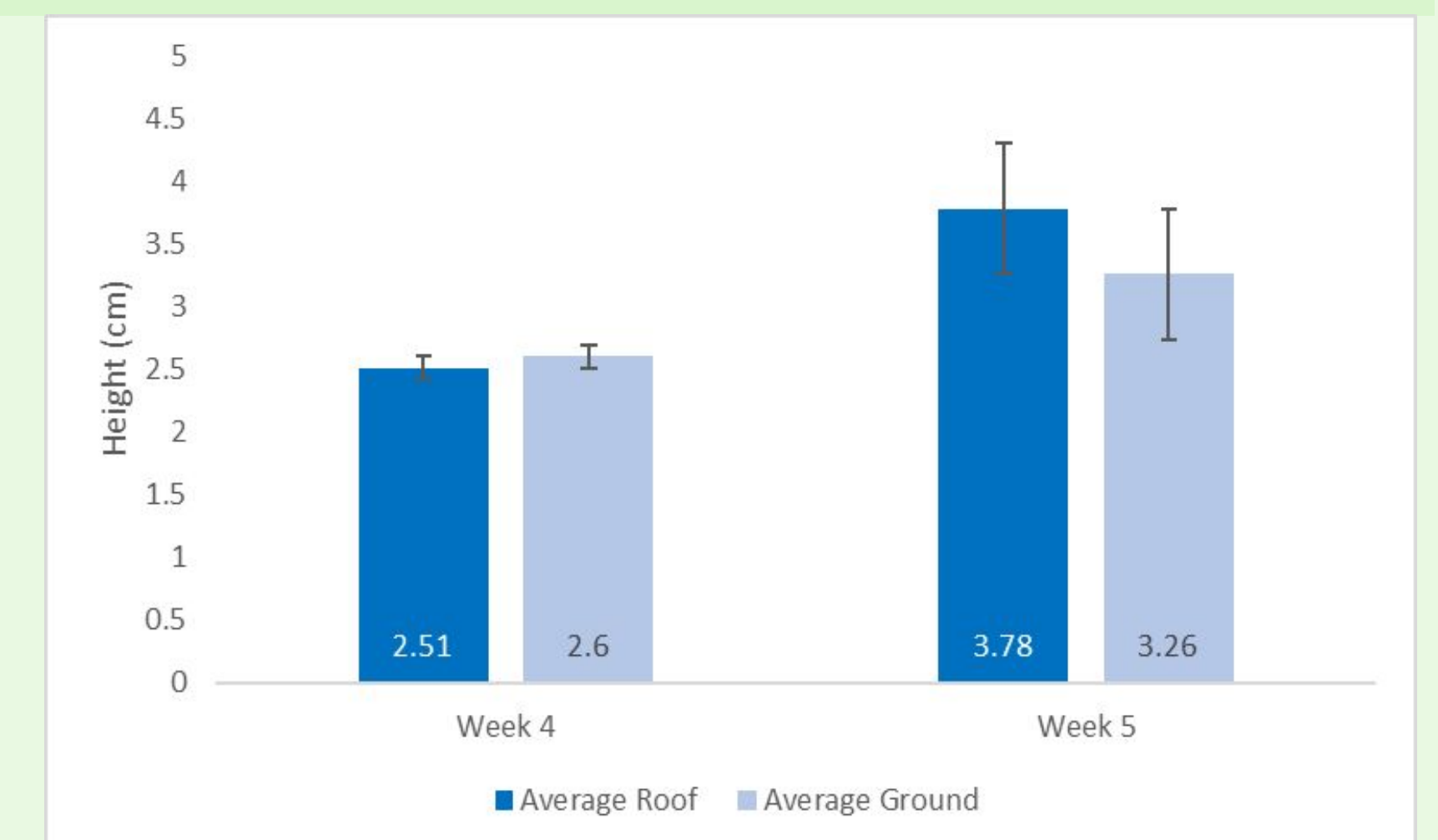
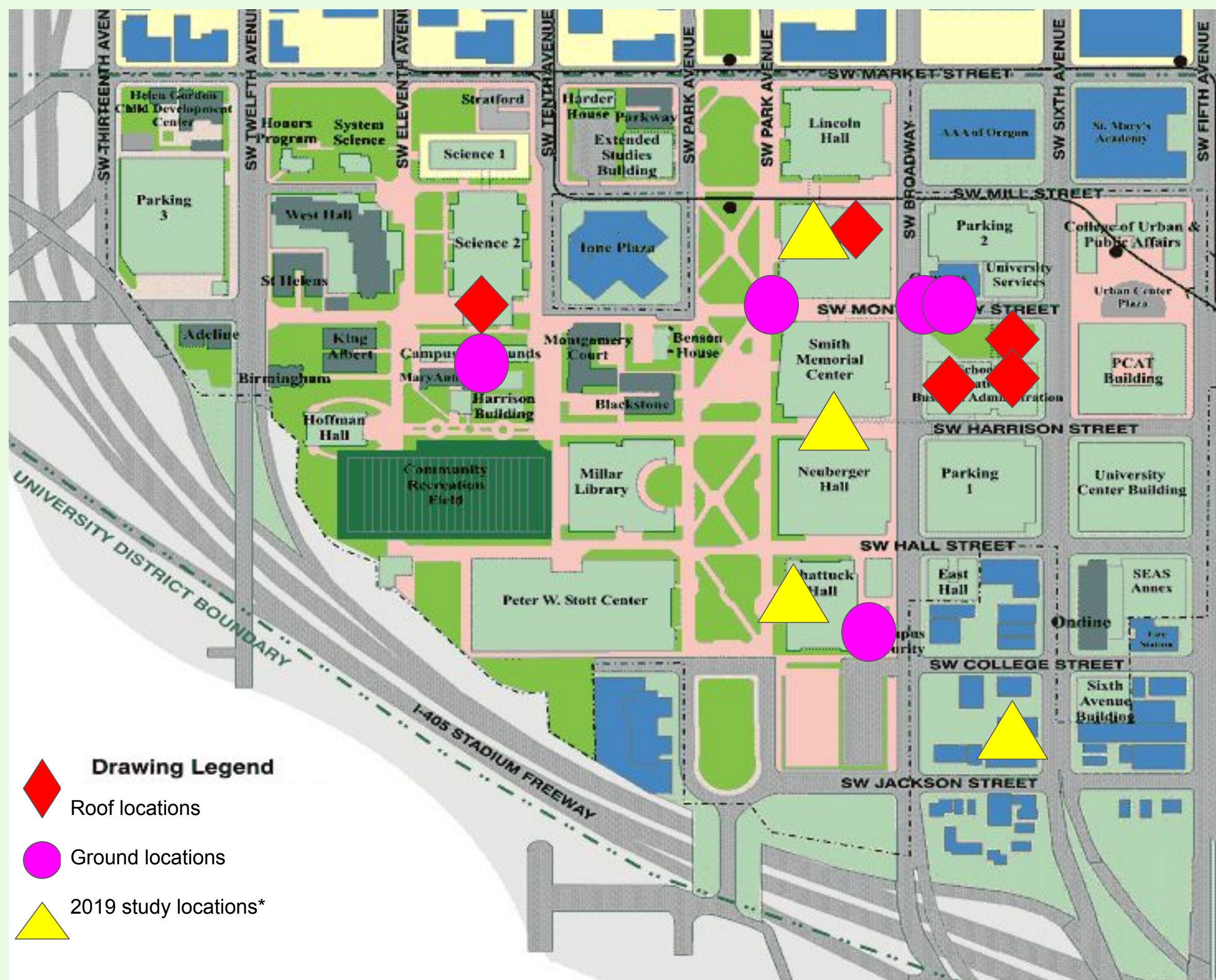


Figure 2, Spinach leaf heights on roof vs ground over week four and five

## Map 1, Map of site locations and previous site\* locations



Map 1, Map of site locations and previous site\* locations

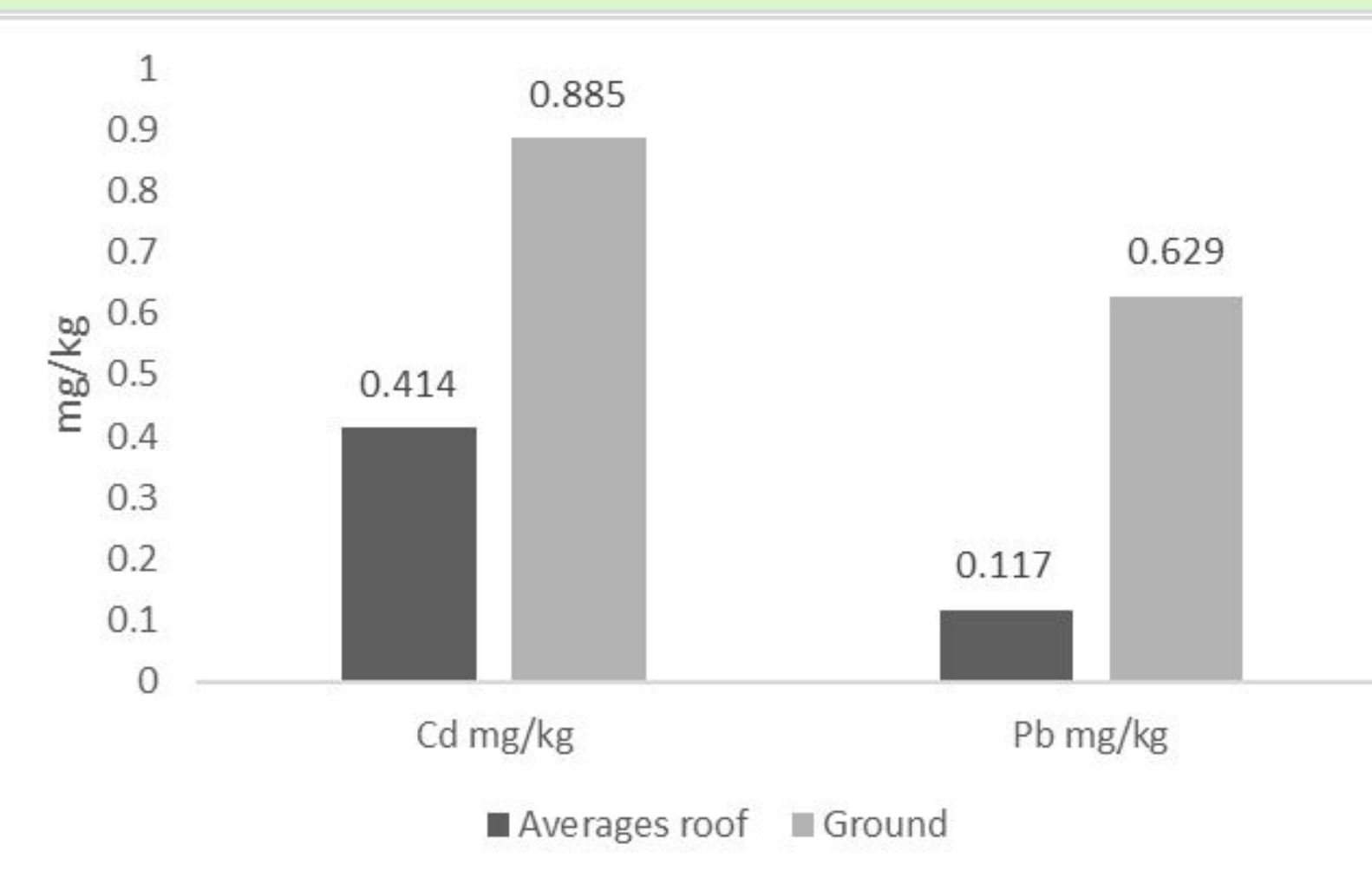


Figure 3, Mg of metal per kg of cadmium and lead historical data\*

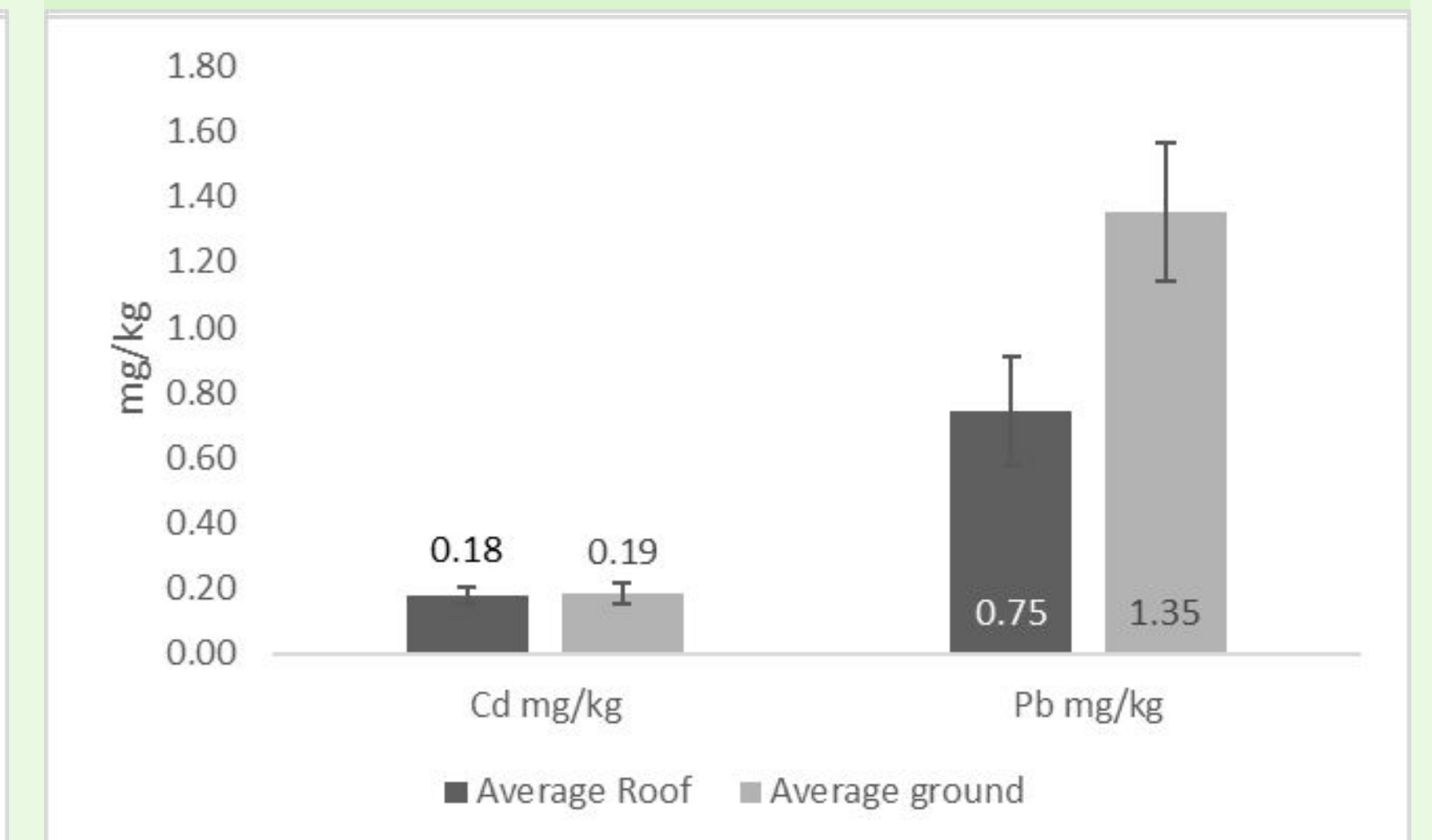


Figure 4, Mg of metal per kg of cadmium and lead historical data\*

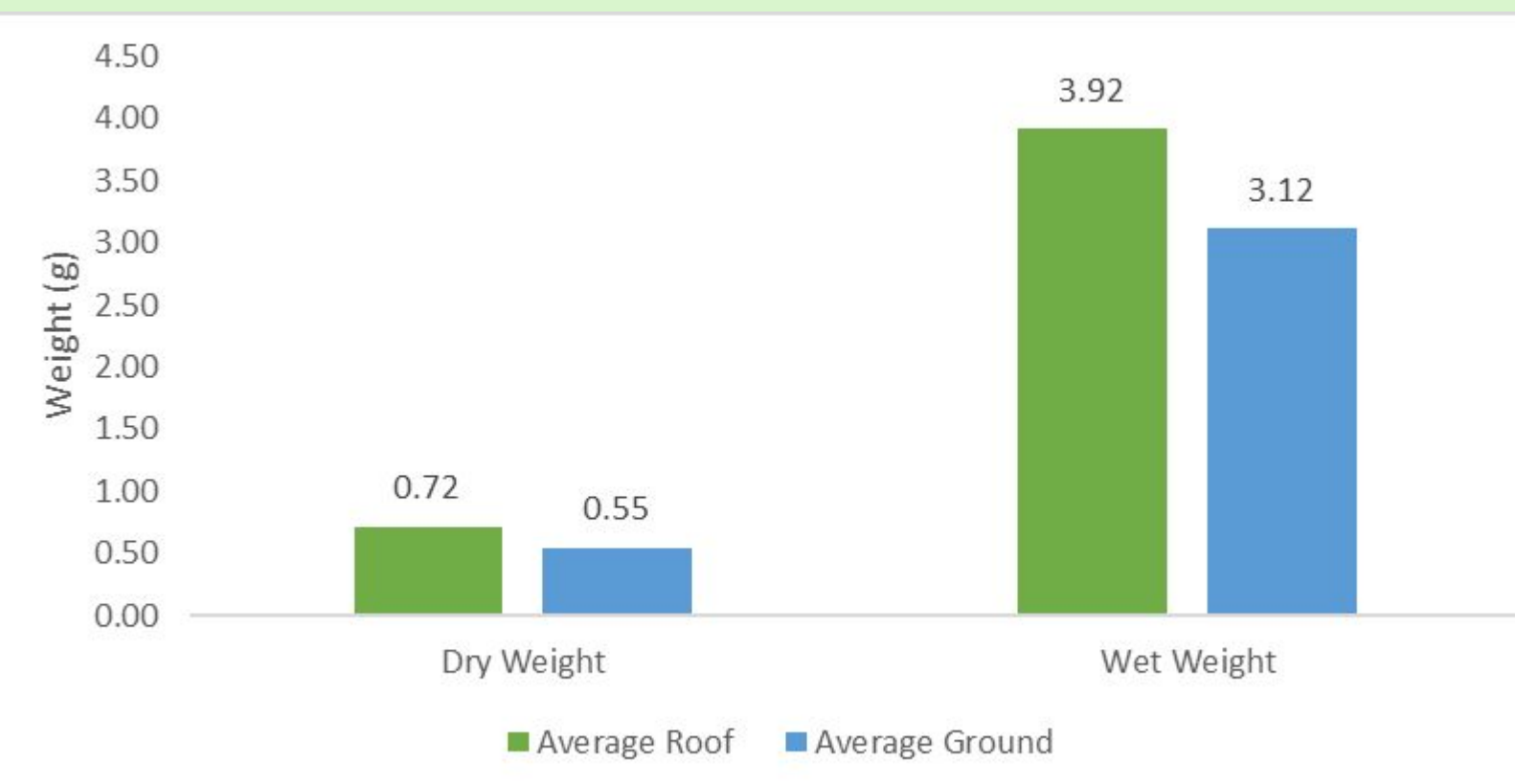


Figure 5, Average dry and wet weights from roof and ground, historical data\*

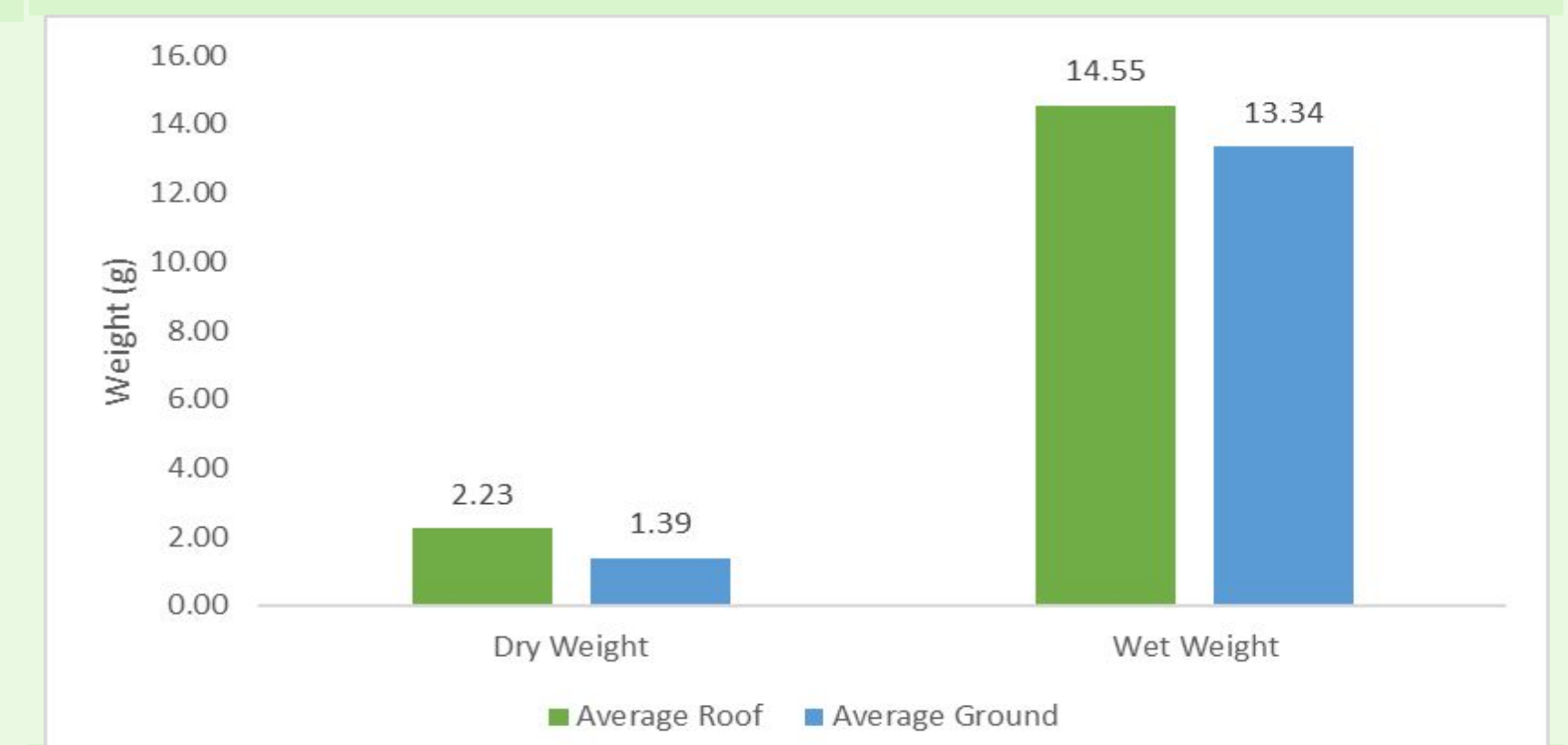


Figure 5, Average dry and wet weights from roof and ground

## Project Design



## Conclusion

Larger Cotyledon is linked to higher nutritional value and was shown to be taller, while also having taller spinach leaves in early development and less heavy metals seen on the roof. The roof also was seen to have less disruption by outside influences including animals and humans. There was no statistically significant difference between the dry and weight weights for both historical data\* and from the 2021 data.

**Overall the roof was more favorable than the ground locations in cotyledon heights, less disruption from outside influences and less heavy metals from both historical data\* and 2021 study.**

**Future Directions:** Compare data collected to store bought spinach, Use different produce that is more native to the Portland State area.

## Works Cited

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