



Introduction:

- **Importance:** Arizona's urbanization and population growth has presented new obstacles in the field of agriculture. Monitoring water usage and higher productivity have become more important (Cerro, 2022). This is because Arizona's water usage has increased and land for agriculture has been lost for urban development (Larson et al., 2013).
- **Objective:** During our experiment we will explore the water usage of indoor and outdoor grown plants in an arid climate. We will also explore the overall size and quality of the plants. The difference is crucial for feeding a growing world.
- **Hypothesis:** Indoor grown plants will use less water than outdoor. The outdoor plants will be larger than indoor grown plants.

Materials & Methods:

Plant Materials:

- African marigold (*Tagetes erecta*) 'Antigua Orange'
- Parsley (*Petroselinum crispum*) 'Darki'

Growth Conditions:

- Indoor (LED lighting) & Outdoor (Sunlight)
- Professional growing mix with mycorrhizae perlite-peat mix
- Fertigation: 150 ppm nitrogen



Fig 1. Experiment set up inside the indoor vertical farm. African marigold (left) and parsley (right) are grown in peat-perlite mix under LED lighting.



Fig 2. Experiment set up outdoors. African marigold (left) and parsley (right) are grown in peat-perlite mix under sunlight with 50% shade cloth.

Table 1. Environmental conditions of the indoor and outdoor treatments

	Indoor	Outdoor
Temperature (°C)	23.9	25.8
Humidity (%)	63.5	35.5
DLI* (mol · m ⁻² · d ⁻¹)	9.7	17.5-20

DLI* = Daily Light Integral

Results:

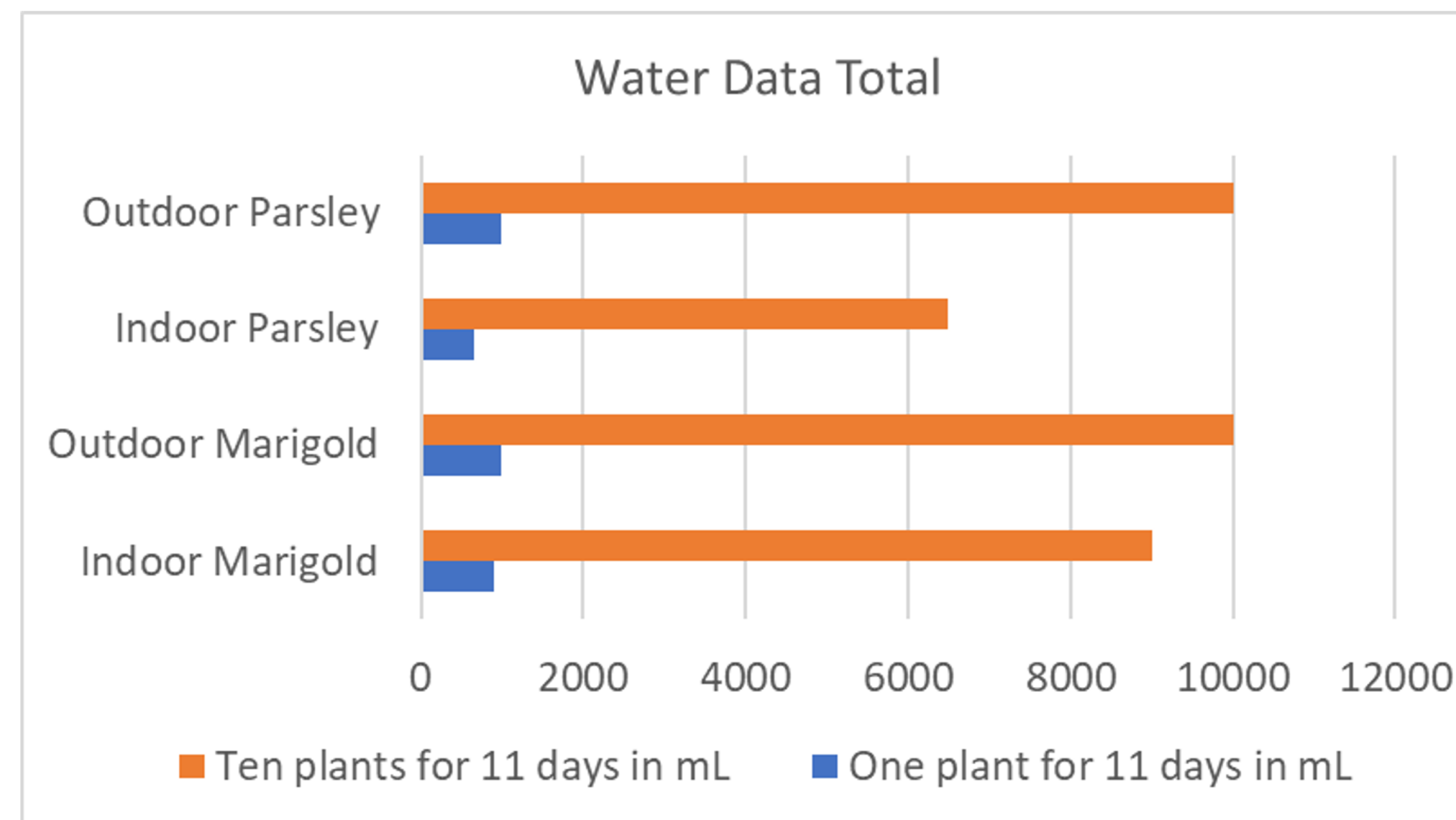


Fig 3. Total water usage for both single and multiple plants over 11 days after transplanting.



Fig 4. Top (top) or side (bottom) view of parsley grown outdoor (left) and indoor (right) 15 days after transplant.



Fig 5. Top (top) or side (bottom) view of African marigold grown outdoor (left) and indoor (right) 15 days after transplant.

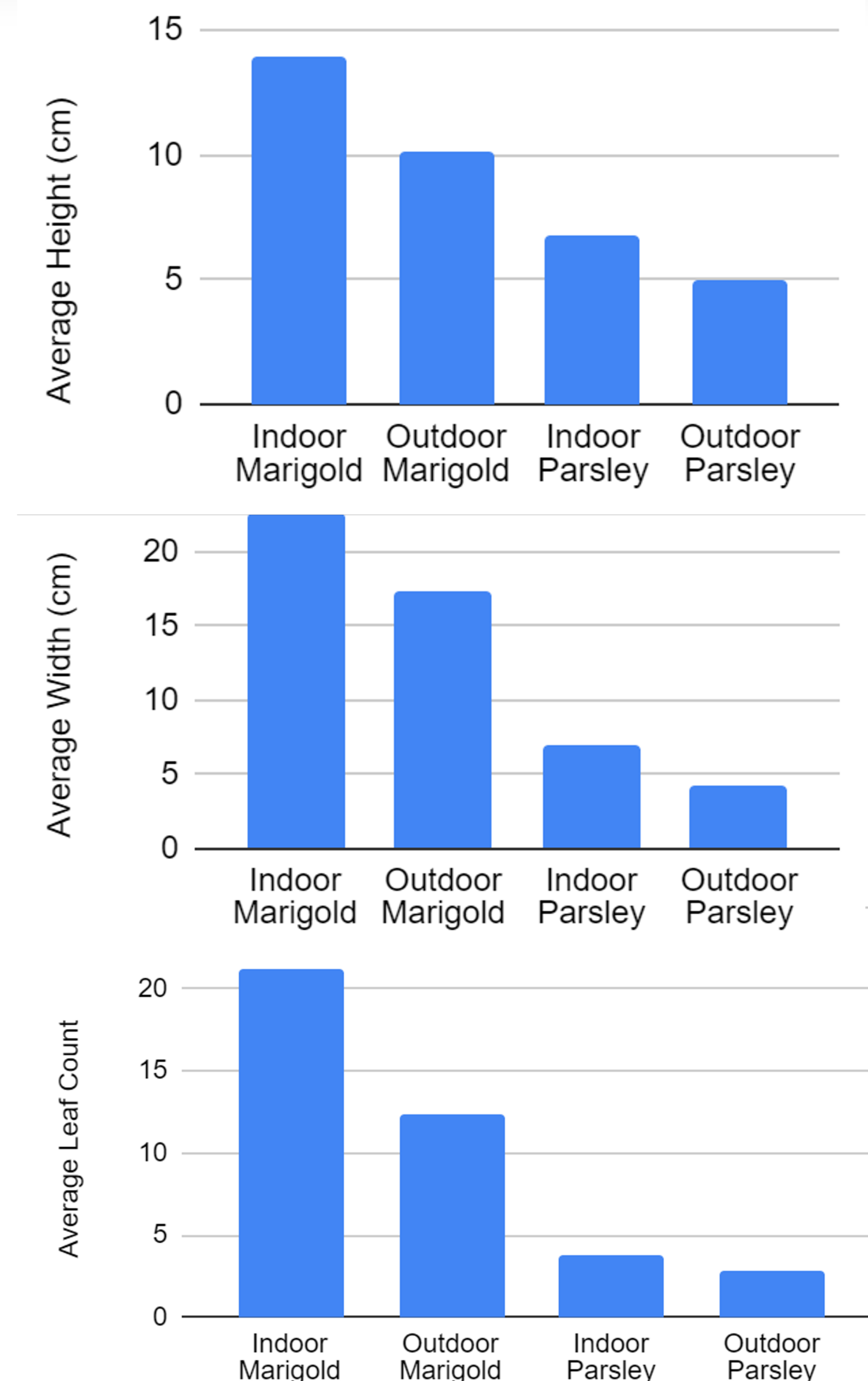


Fig 6. Average height, width, and leaf number of African marigold and parsley grown indoor and outdoor 17 days after transplant. Data represents the mean of 10 plants.

Conclusion:

Our hypothesis was partially correct. African marigolds used 11% less water indoors than outdoors. Parsley used 54% less water indoors than outdoors. The indoor plants for both African marigolds and parsley grew larger than their outdoor plants.

Literature Cited:

- Cerro, C. (2022). Future of Dwelling: Indoor Plants and Produce. Ecology and the Environment. <https://doi.org/10.2495/sc220401>
- Larson, K. L., Polsky, C., Gober, P., Chang, H., & Shandas, V. (2013). Vulnerability of water systems to the effects of climate change and urbanization: A comparison of Phoenix, Arizona and Portland, Oregon (USA). Environmental Management, 52(1), 179–195. <https://doi.org/10.1007/s00267-013-0072-2>