Palms & Plots: Visualizing Trait Diversity in Palm Tree Dataset

INFO 526 – Summer 2025 – Final Project

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Introduction

- Palms are ecologically crucial in tropical and subtropical ecosystems.
- Traits like stem height, spines, and fruit colour affect survival and seed dispersal.

Why are we visualizing palm trees?

- Includes detailed structural and reproductive traits.
- Exploring the diversity of these traits helps us understand how palms adapt to their environments and contribute to the structure and function of tropical ecosystems.
- The large number of species and the wide range of traits offer to explore biological patterns at scale.

About the Dataset

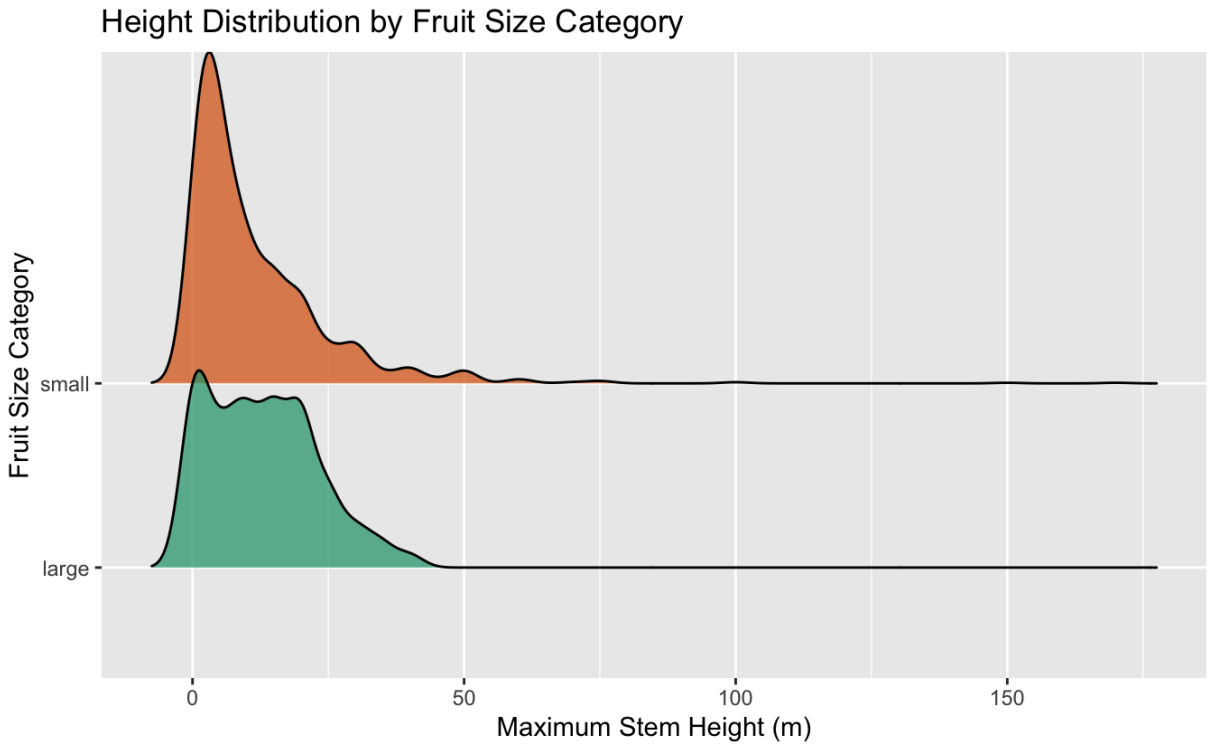
- The dataset we are using in this project is from the PalmTraits 1.0 database via the palm trees R package by Emil Hvitfeldt.
- Captures functional traits critical to palm growth, survival, and reproduction, such as stem height, leaf number, fruit size, and color.
- PalmTraits 1.0 is a global compilation of ecological and morphological traits for over 2,500 palm species.
- Contains both numerical traits and categorical traits.

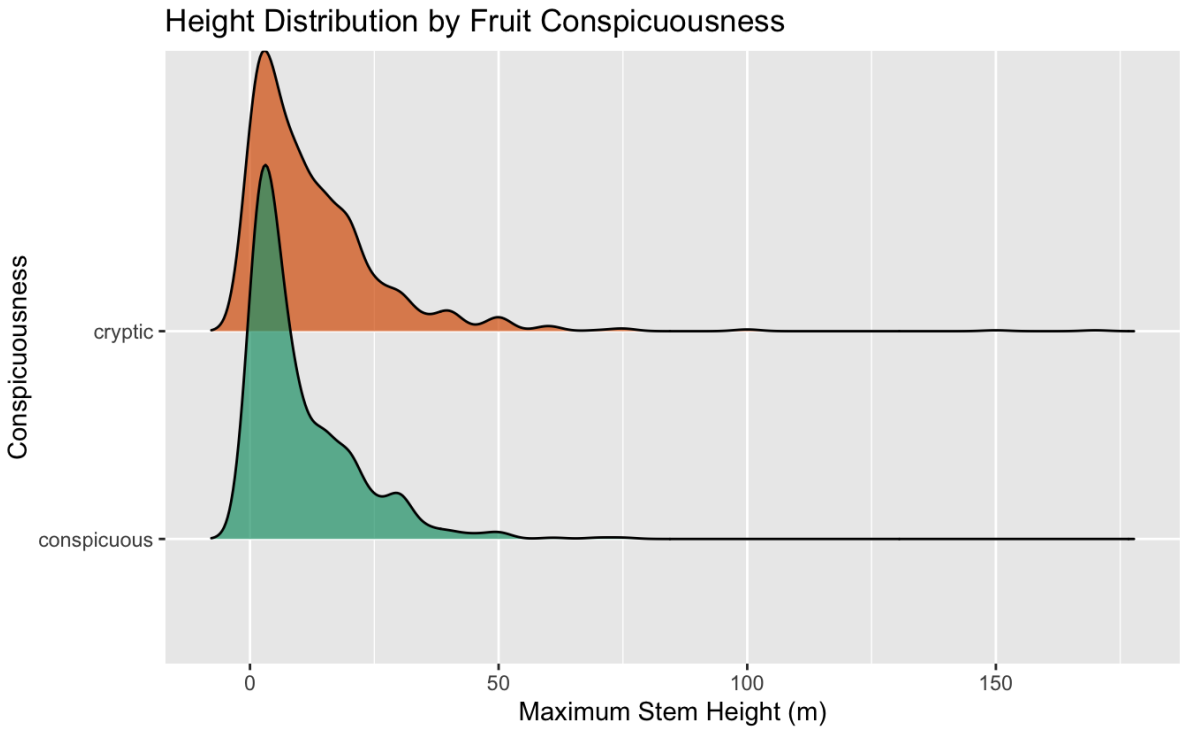
Research Questions

- Which palm traits exhibit the most variability across species, and how do fruit traits (size and conspicuousness) relate to stem height?

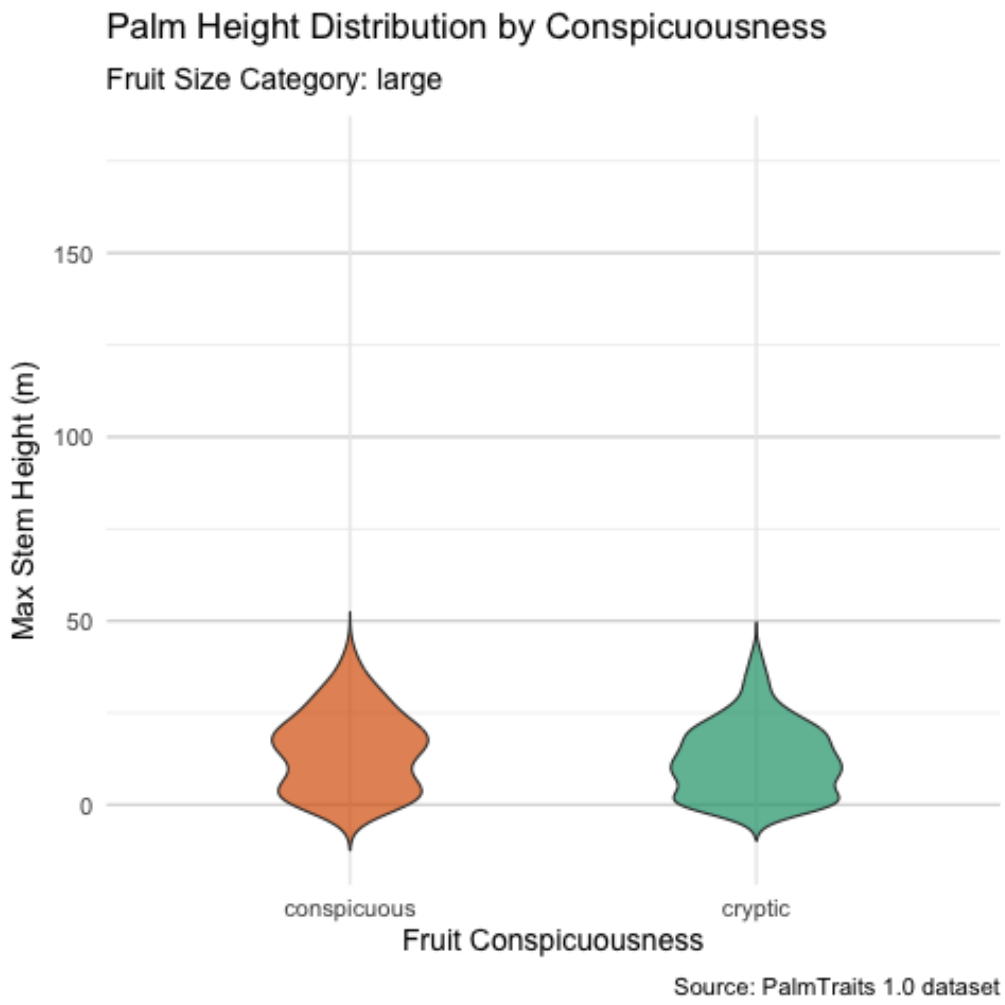
- Do defence traits like spines on leaves and stems co-occur with particular growth habits (climbing vs erect palms)?

Question 1 visualization

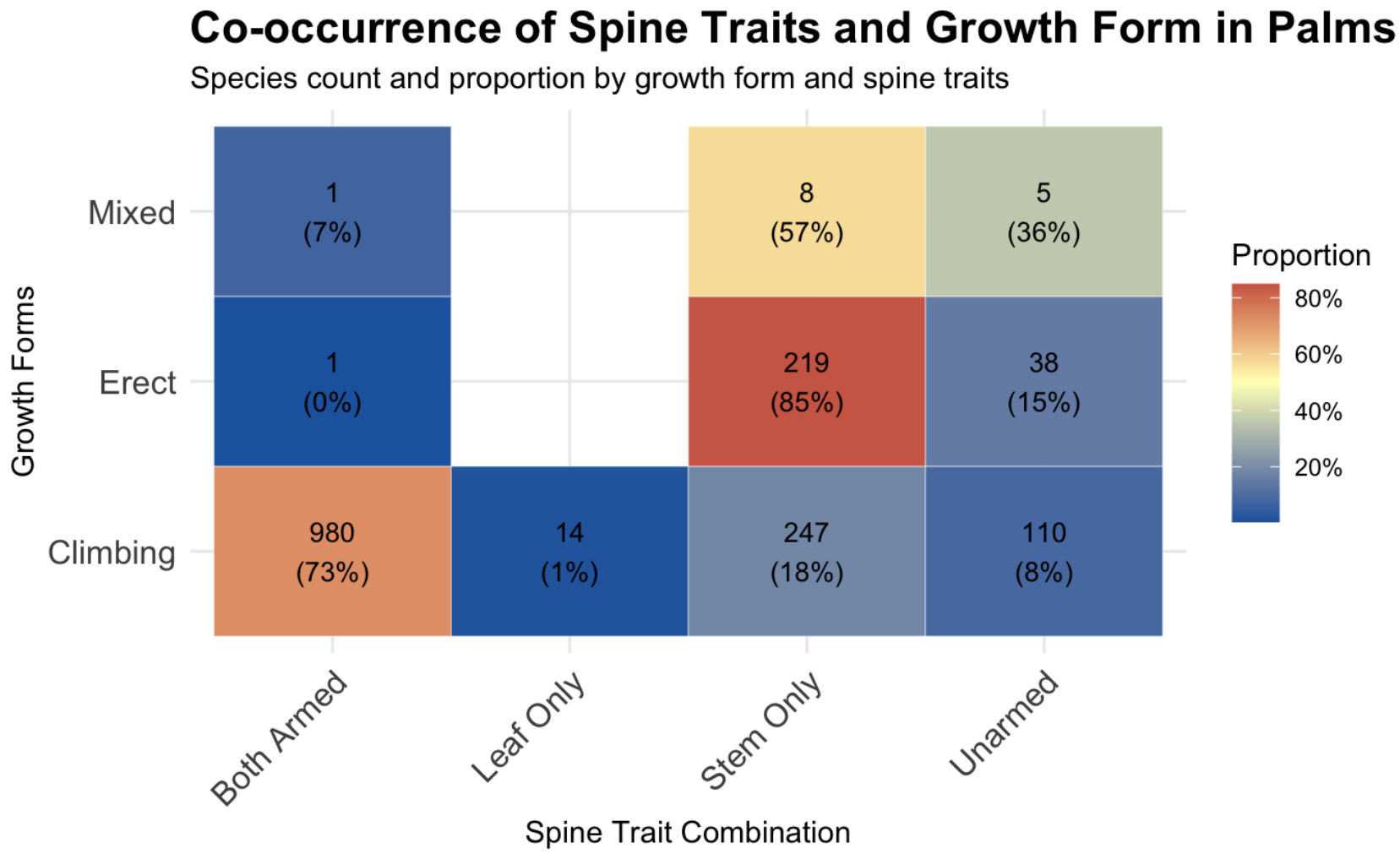




Question 1 visualization



Question 2 visualization



Conclusion

- Stem height exhibits the greatest variability among palm species, followed by fruit size and fruit conspicuousness.
- Palm species with large fruits tend to have taller stems compared to those with small fruits. Among large-fruited palms, species with conspicuous fruits tend to grow taller than those with cryptic fruits.
- Climbing palms are most often armed on both leaves and stems (73%), while erect palms predominantly exhibit stem-only spines (85%), indicating strong associations between defence traits and growth habits.
- Some spine and growth form combinations are rare or nearly absent — for example, almost no erect palms have both leaf and stem spines, and “Leaf Only” defence is uncommon in all growth forms.
- Explore how traits vary by geographical regions.