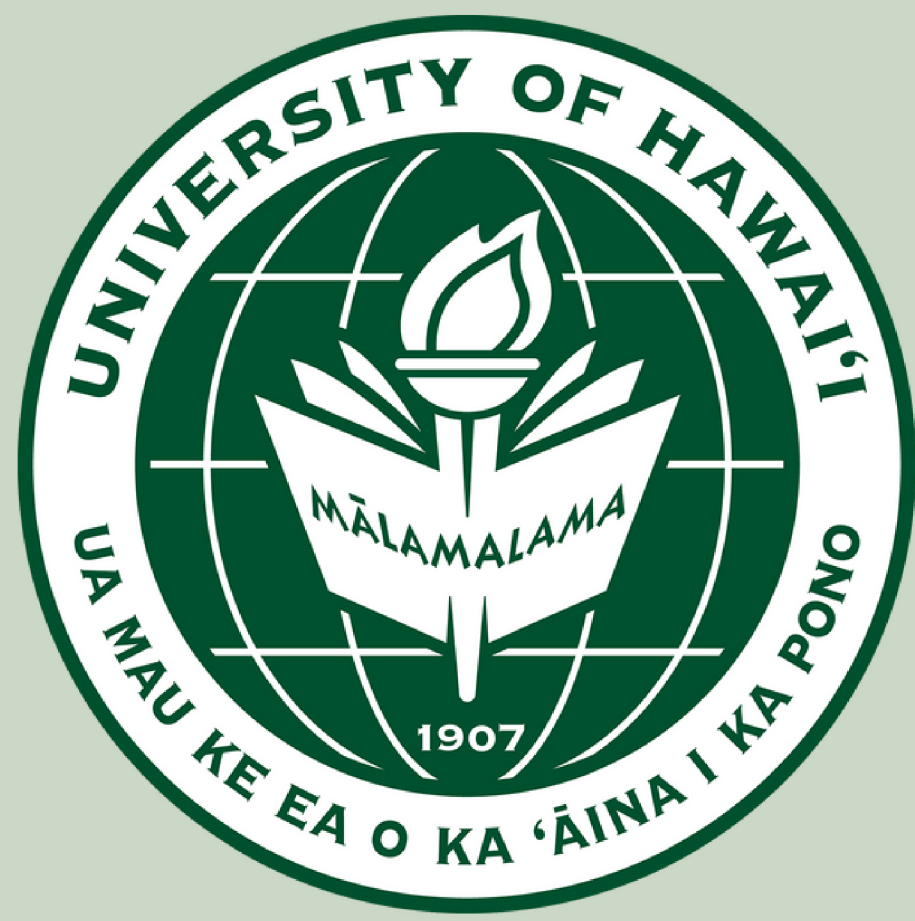




Corn conundrum: the differential growth of maize genotypes adapted to different geographic locations



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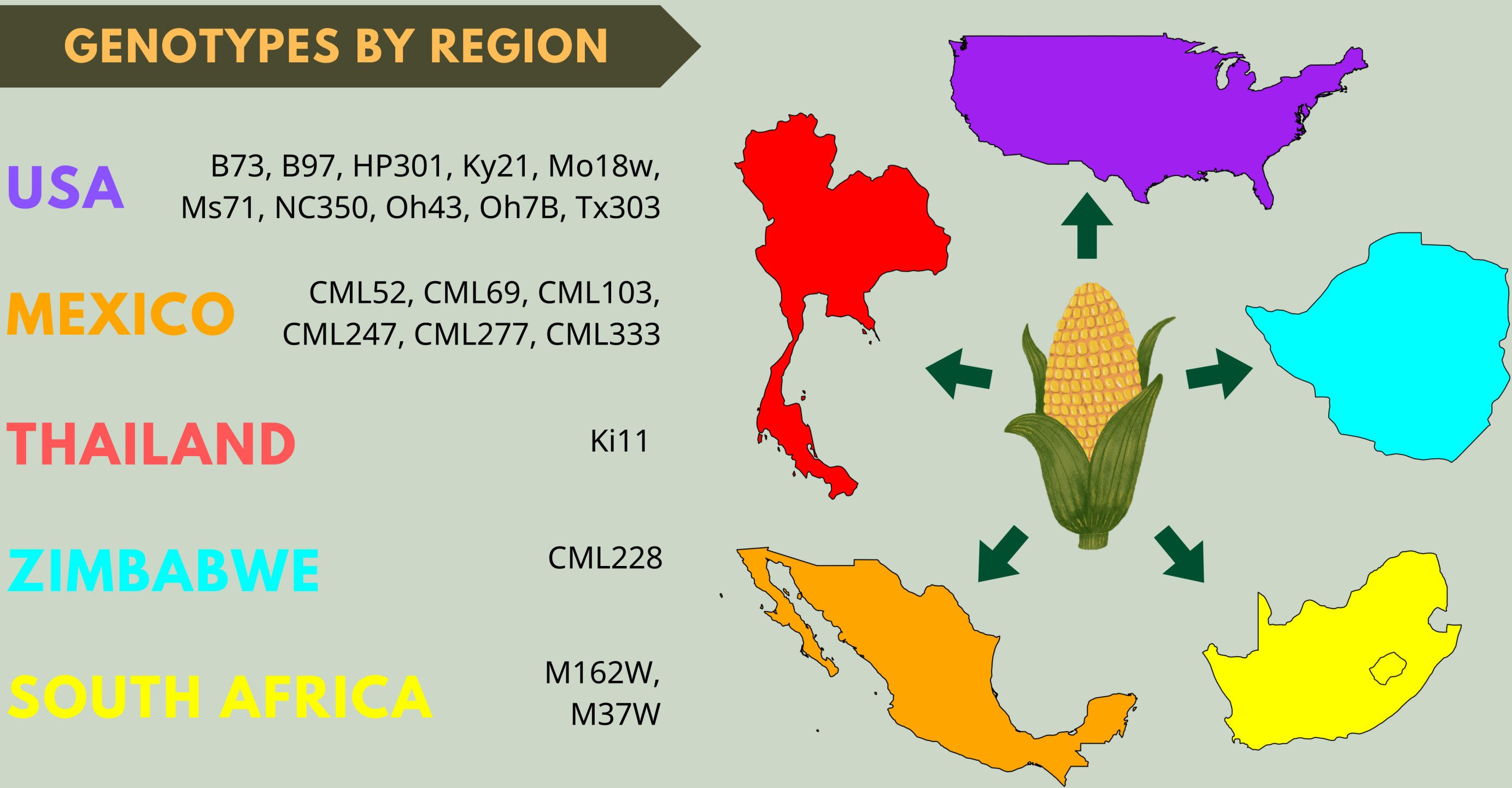


1

REGIONS AND GENOTYPES

IMPORTANCE: Geographic location plays a crucial role in the growth and development of crops. Thus, it is important to investigate phenotypic variation of maize genotypes adapted to different locations around the world.

OBJECTIVE: We seek to observe whether maize genotypes from similar regions exhibit similar growth patterns such as leaf growth and root structure. Multivariate analyses were utilized to highlight the phenotypic differences between maize from different regions.



2

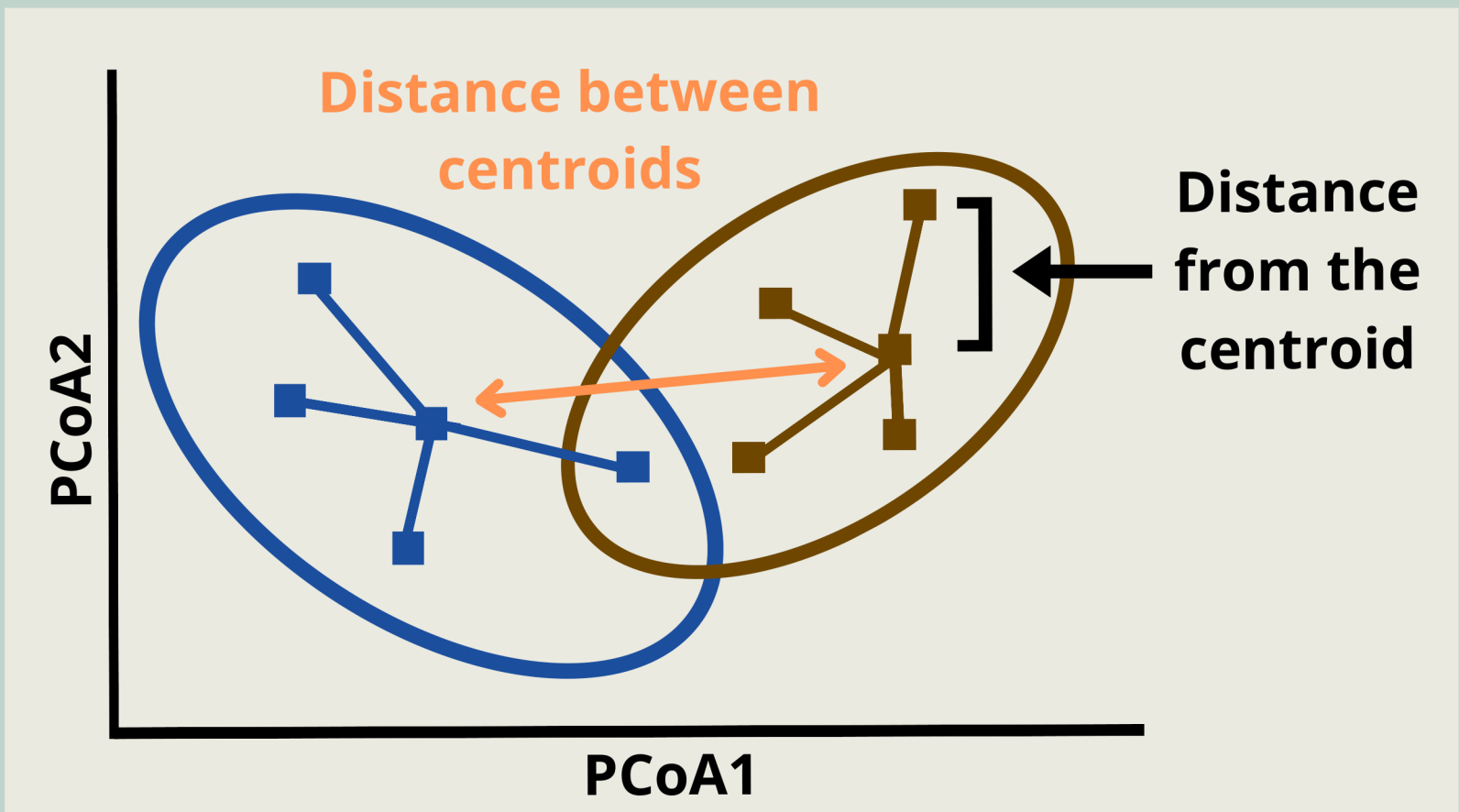
ALGORITHMS USED

Principal Component Analysis (PCA)

PCAs were used for both leaf and root measurements to highlight phenotypic differences between different regions.

Principal Coordinate Analysis (PCoA)

Using a distance matrix created from the collected phenotypic measurements, we explored the magnitude of differences between regions.



3

VISUALIZING THE MAGNITUDE OF VARIANCE

FIGURE 1

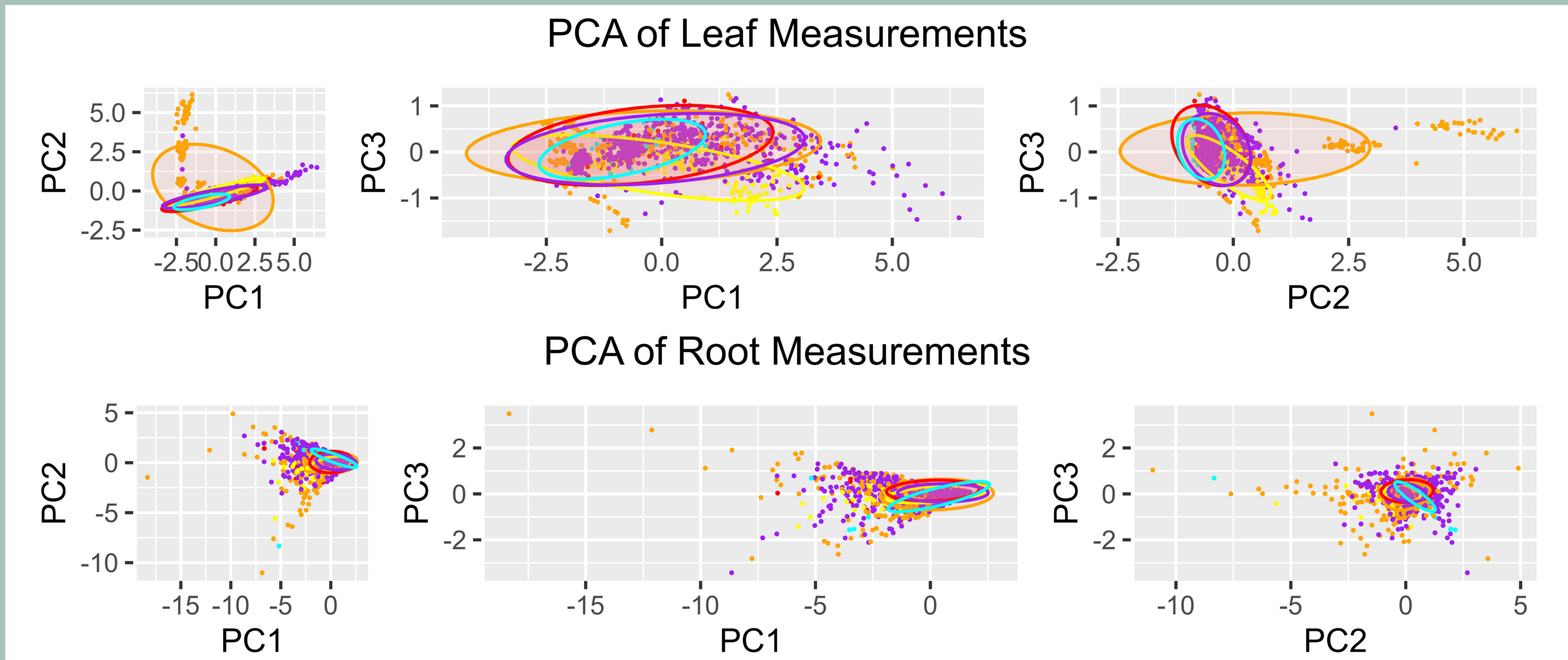


Figure 1: PCA shows that Mexico exhibits highest variance in terms of leaf measurements.

Figure 2: PCoA shows that Mexico has the highest level of variance.

Table 1: Average distance of data points to centroids within each region. Higher values signify higher magnitudes of variance.

FIGURE 2

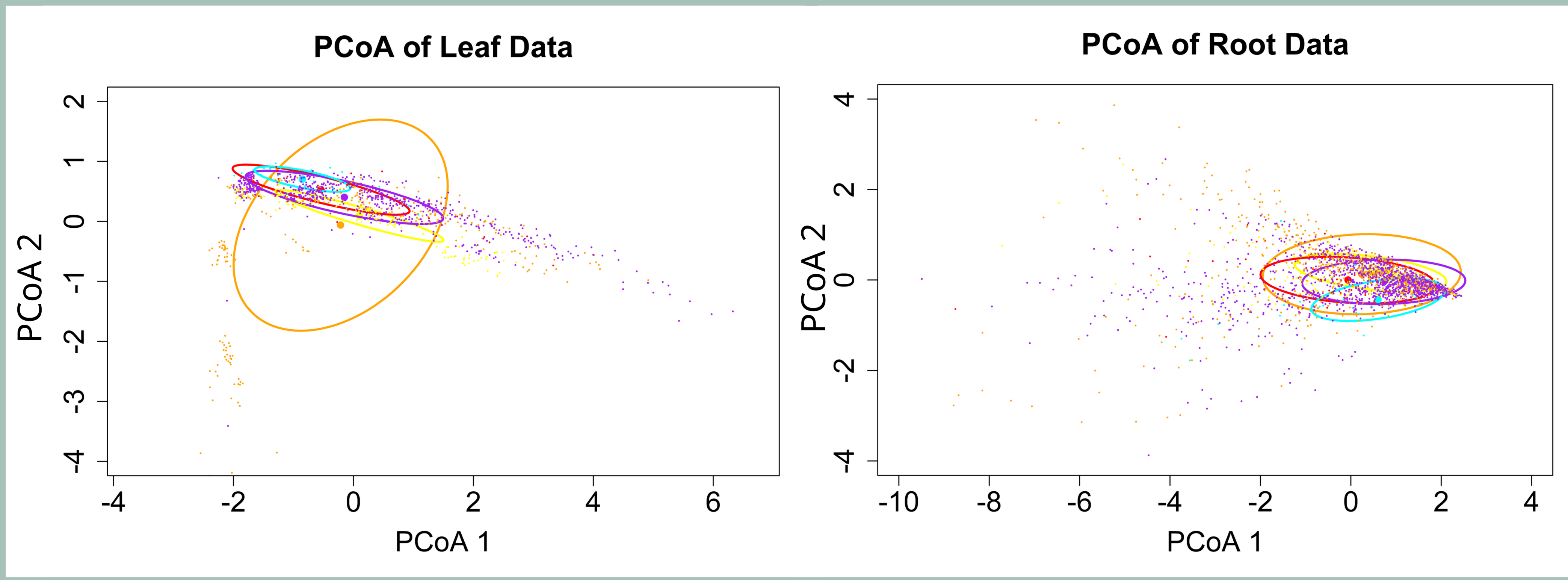


Table 1

Average Distance From Centroid

Region	Leaf	Root
USA	1.427	1.325
Mexico	2.171	1.665
Thailand	1.233	1.418
Zimbabwe	0.823	1.203
South Africa	1.327	1.280

4

OUR FINDINGS

- Maize genotypes that were adapted to different regions exhibit phenotypic variation.
- Maize genotypes cluster similarly based on leaf and root growth.
- Maize genotypes from Mexico demonstrate the most variance in both leaf and root growth.
- All regional combinations are significant from each other except USA and Thailand.

5

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