



Understanding the Genetic Diversity of *Scaevola taccada* and *Scaevola plumieri* on Vieques, Puerto Rico

Abby Wine

Spring 2019 Junior 302 Research

Susan Swensen Witherup



What is *Scaevola*?

- Genus of flowering plant in family Goodeniaceae
- 130 tropical species
- Originated in Australia



Scaevola plumieri



Scaevola taccada



Scaevola aemula

Global Distribution of *S. plumieri* and *S. taccada*



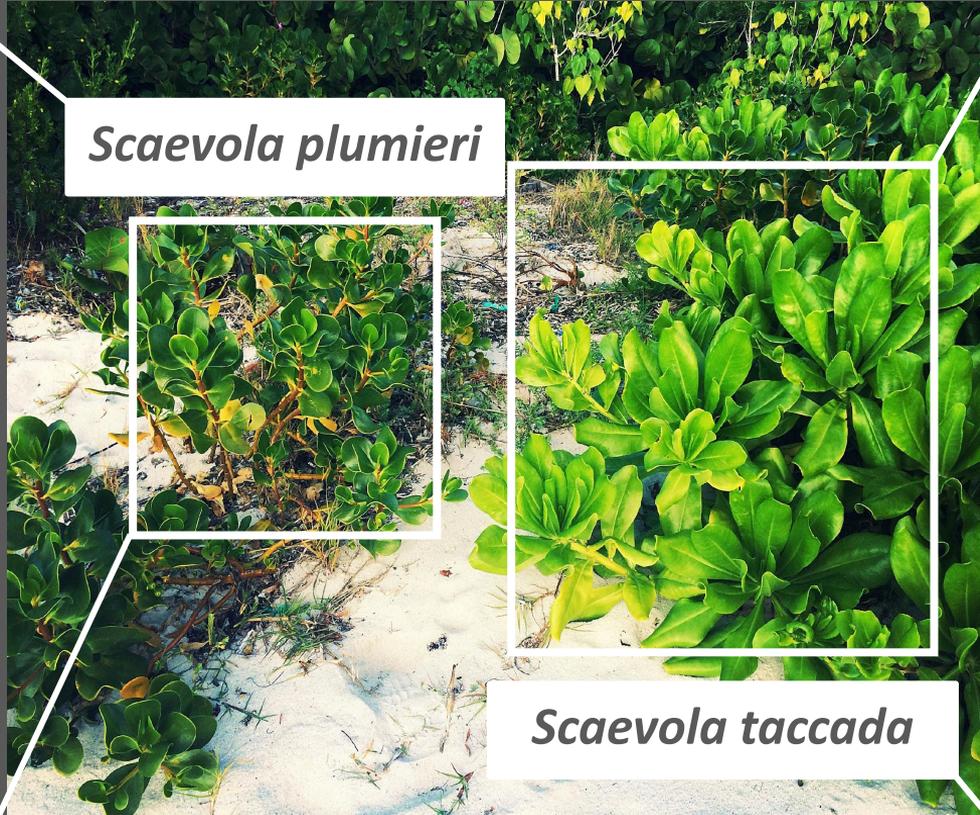
 *S. plumieri*

 *S. taccada*

Two Species of *Scaevola* Co-Inhabit Vieques, PR



Scaevola plumieri



Scaevola taccada



Goals of This Research

- 1** Understand the genetic diversity and genetic structure of the *S. plumieri* and *S. taccada* on the island of Vieques
- 2** Identify if there is gene flow between the different populations and whether the species are in HWE
- 3** Understand if genetic diversity correlates with distance between populations of both *S. plumieri* and *S. taccada*

Hypotheses

- 1 *S. plumieri* is well established and will have more genetic diversity and genetic structure than *S. taccada*.
- 2 There will be gene flow between beach populations in both species because they share pollinators.
- 3 Geographic distance will affect genetic structure.

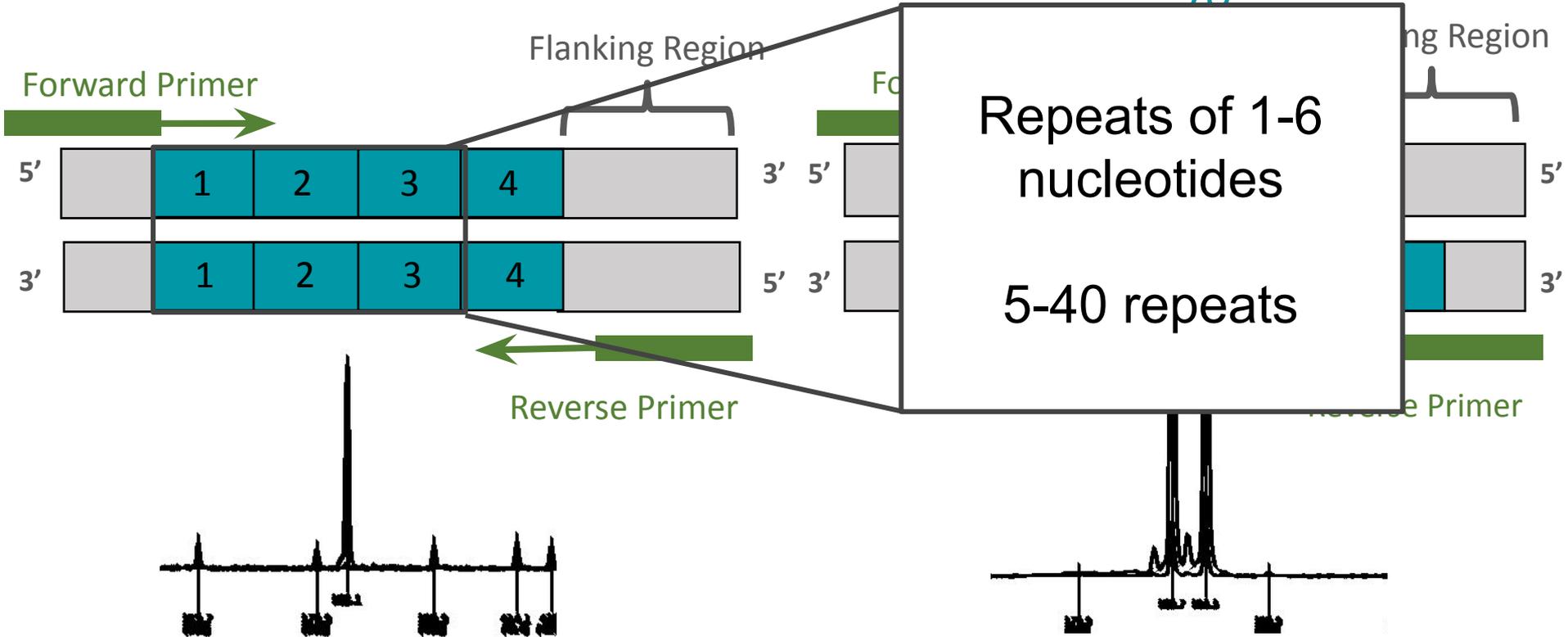
Is this a microsatellite?



Understanding Microsatellites

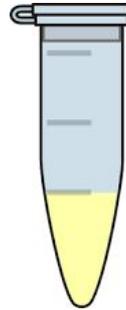
Homozygotes

Heterozygotes





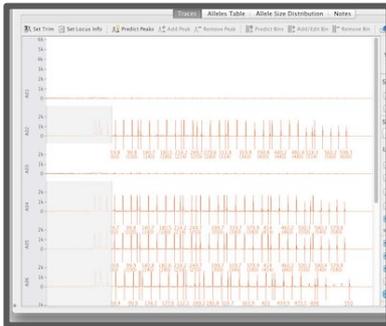
**Samples Collected
& Kept in Silica Gel**



**DNA Extracted
from Plant Tissue**



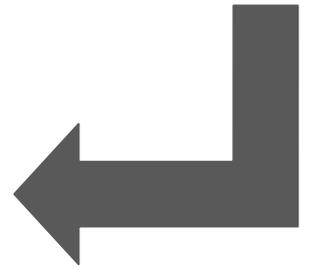
**Run PCR to amplify
MSAT loci**



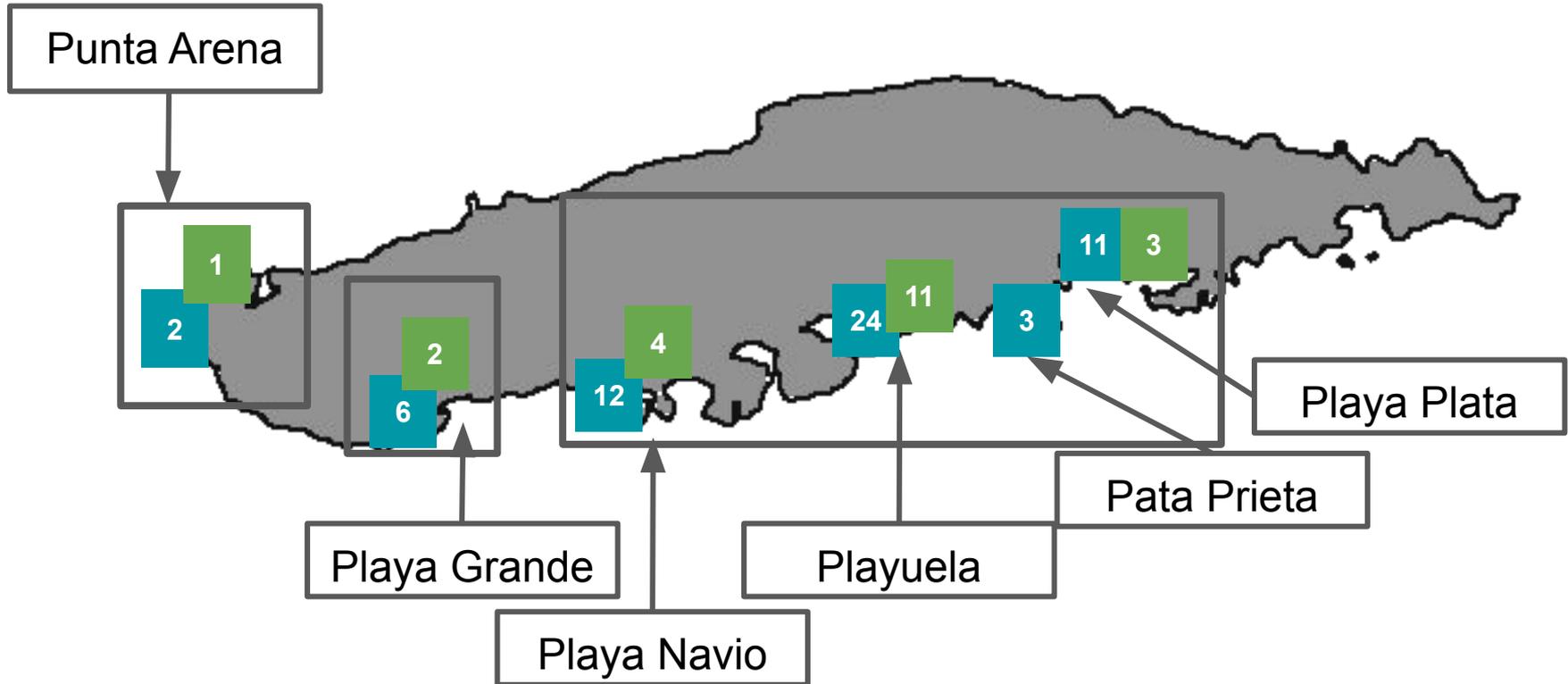
**Score MSAT Peaks
on Geneious**



**Send plates for
fragment analysis**



Population Sampling



Hardy-Weinberg & Garza-Williamson

S. plumieri

S. taccada

Beach	Expected Het.	Observed Het.	G-W Index	Expected Het.	Observed Het.	G-W Index
Playuela	0.50	0.32**	0.50	0.33	0.34	0.40
Punta Arena	0.46	0.50	0.65	MONOMORPHIC		
Playa Grande	0.26	0.60	0.36	0.46	0.17	0.61
Playa Navio	0.26	0.33	0.72	0.29	0.50	0.67
Playa Plata	0.46	0.32**	0.54	0.29	0.70*	0.52
Pata Prieta	0.40	0.67	0.41			

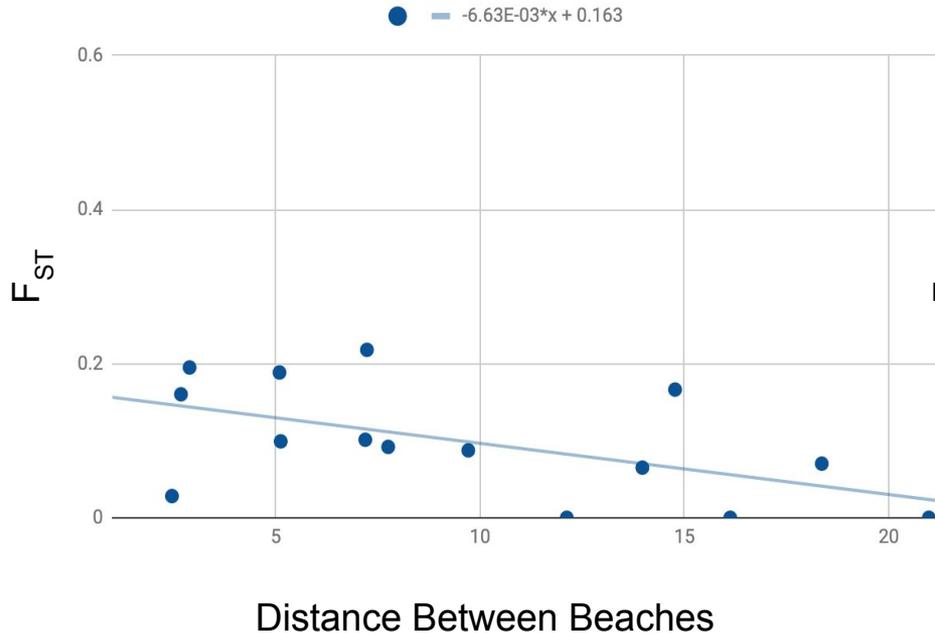
* = statistically significant ($p < 0.05$); # of asterisks correlate to # of sig. loci

Where is Variation Happening?

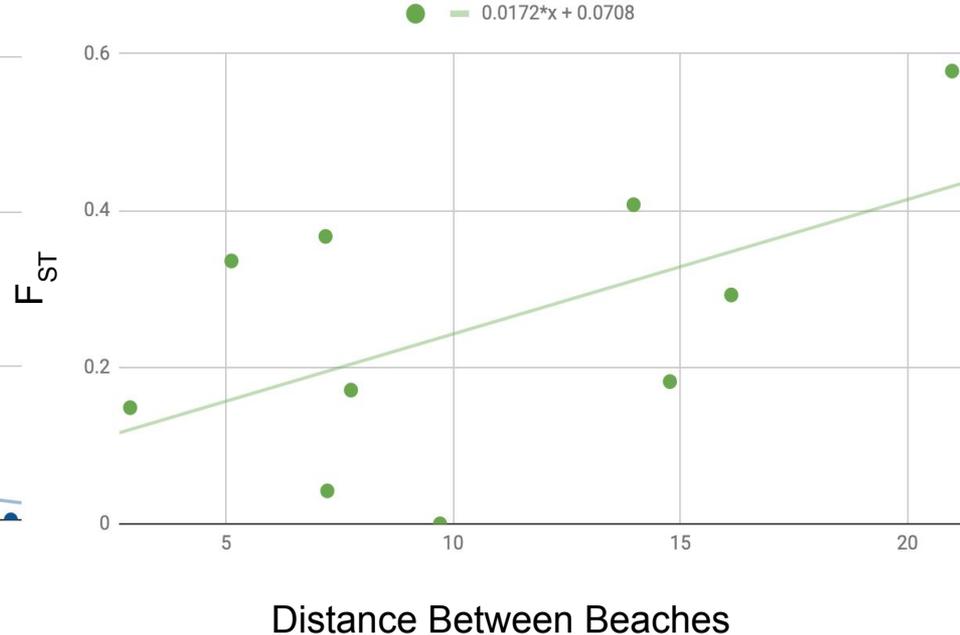
Source of Variation	Percentage of Variation (%)	
	<i>S. plumieri</i>	<i>S. taccada</i>
Among Groups	0	0
Among Populations Within Groups	13.67	26.06
Within Populations	32.30	23.69
Within Individuals	62.22	63.35
Fst Value	0.09	0.24

Results: Mantel Test

Scaevola plumieri



Scaevola taccada



Conclusions

Hypothesis: *S. plumieri* is well established and will have more genetic diversity and genetic structure than *S. taccada*.

→ **FALSE**

◆ More genetic diversity seen in *S. taccada*

Conclusions

Hypothesis: There will be gene flow between beach populations in both species because they share pollinators.

→ There is low gene flow in *S. plumieri* and moderate gene flow in *S. taccada*.

S. plumieri

S. taccada

	<i>S. plumieri</i>	<i>S. taccada</i>
Fst Value	0.09	0.24

0.09

0.24

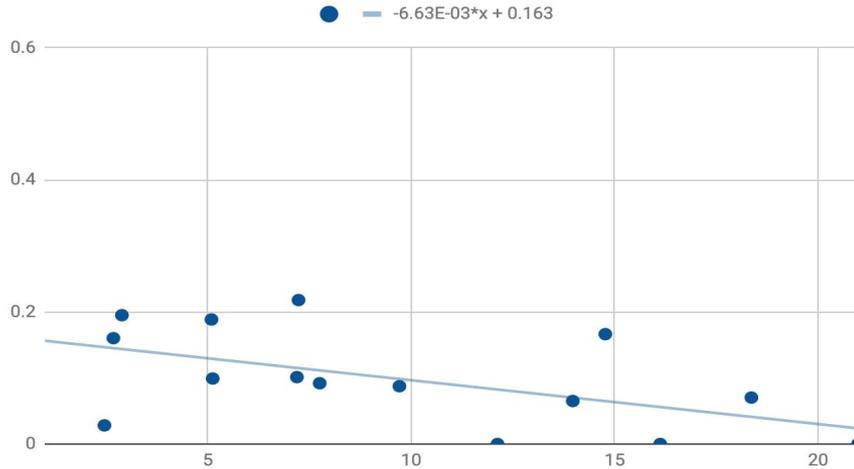
Conclusions

Hypothesis: Geographic distance will affect genetic structure.

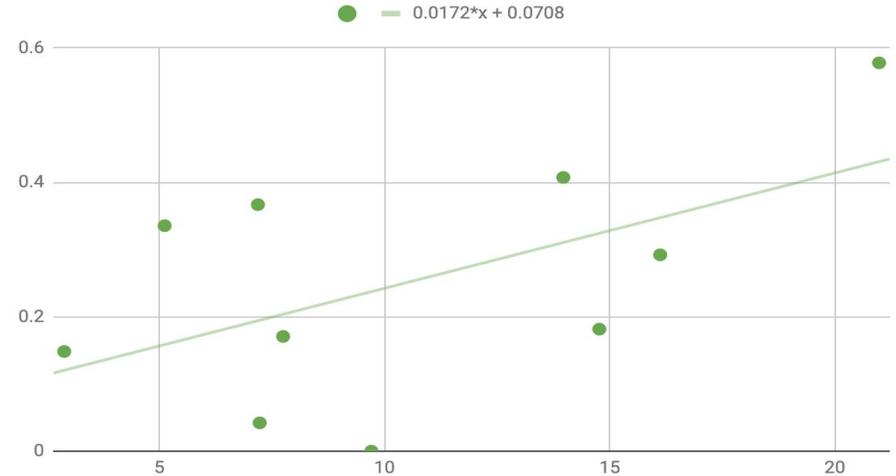
→ ***S. plumieri*: FALSE**

***S. taccada*: TRUE**

Scaevola plumieri



Scaevola taccada



Future Directions

1

Apply additional primers to examine more MSAT loci
& combine all previous data

2

Collect and analyze samples from the main island of
Puerto Rico



Acknowledgements





Any Questions?

References

Images:

https://www.google.com/search?tbm=isch&q=scaevola+plumieri&*&imgrc=TixWO9CckRZYnM:&cad=h#imgrc=ETWakoc3Cu0HfM:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5004837/>

Additional images of Scaevola from Witherup Lab members!

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5004837/>

DNA is Extracted from Lyophilized Leaf Samples



Preparation

DNA is Amplified via PCR

Template DNA



Samples Were Collected from Across Vieques

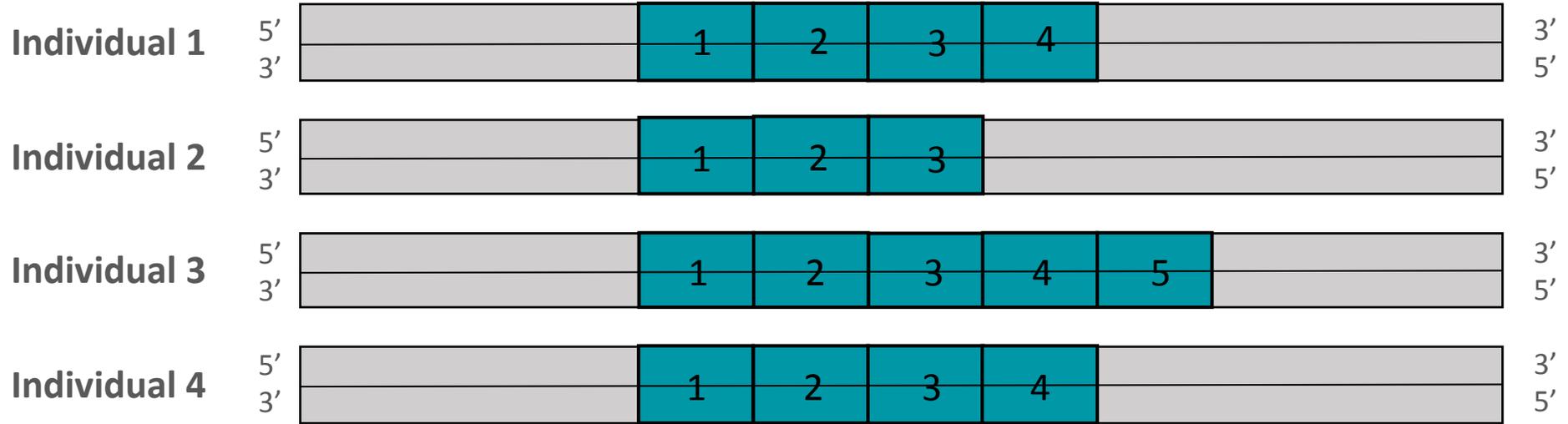
Number of Samples From Each Research Site on Vieques, PR

	Playuela	Punta Arena	Playa Grande	Playa Navio	Pata Prieta	Playa Plata
<i>S. plumieri</i>	24	2	6	12	3	11
<i>S. taccada</i>	11	1	2	4	0	3

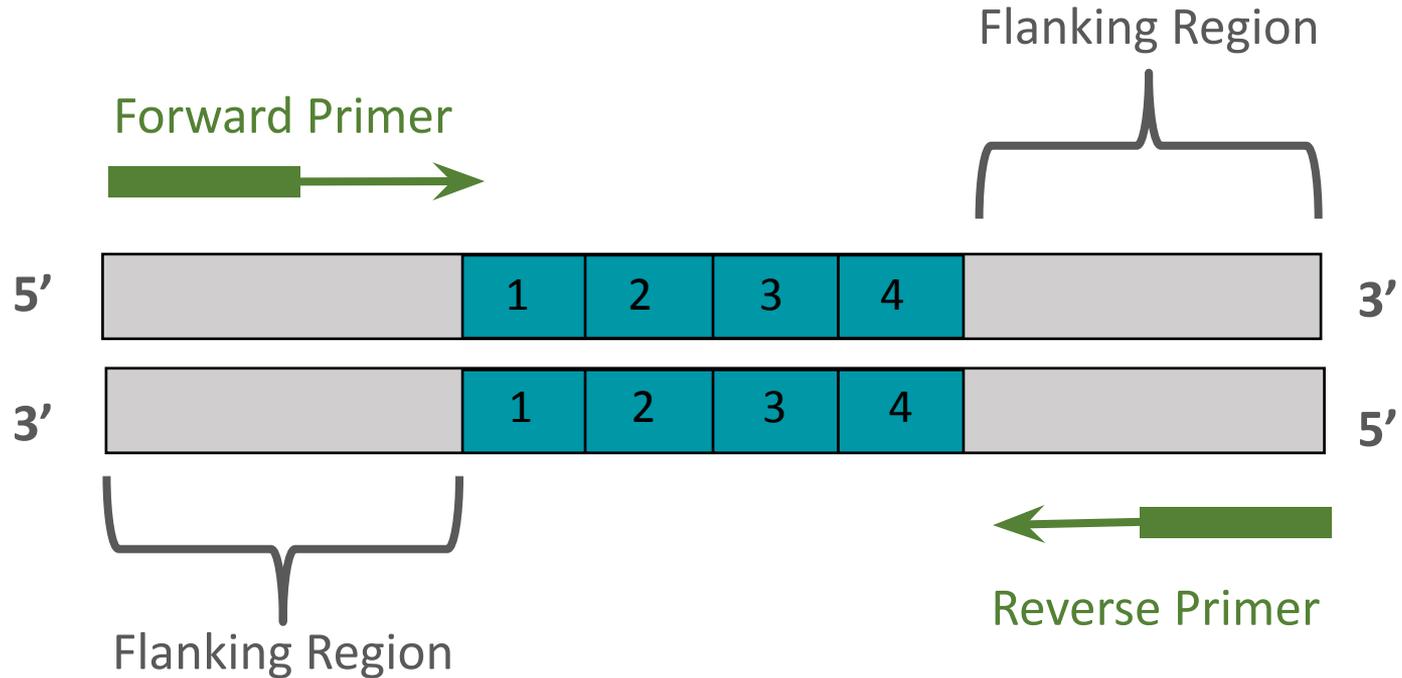
S. plumieri = 58 samples

S. taccada = 21 samples

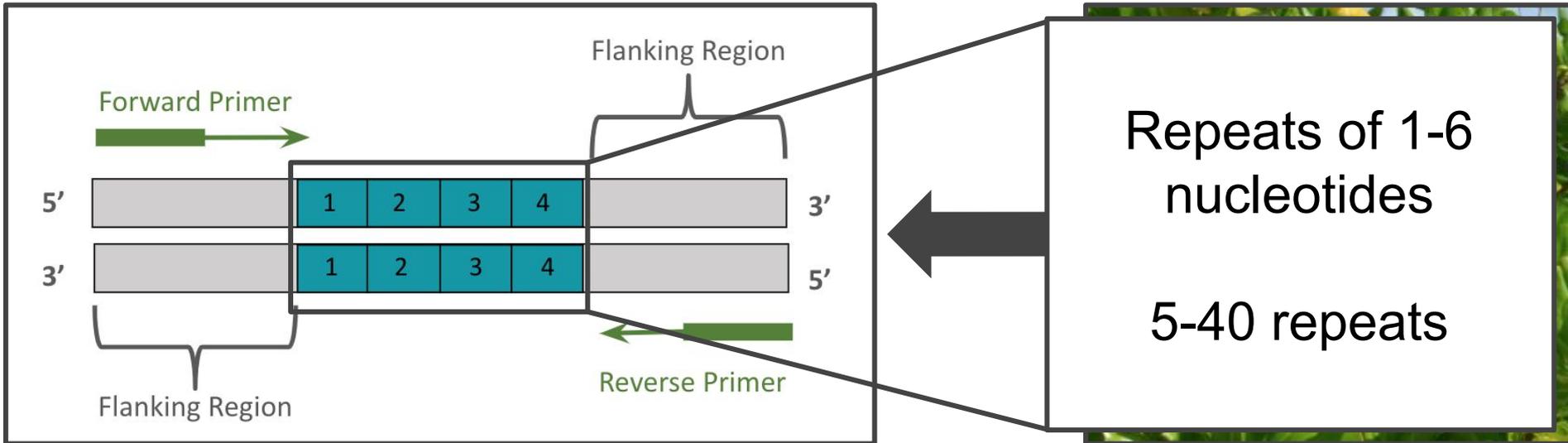
Variability Between Individuals



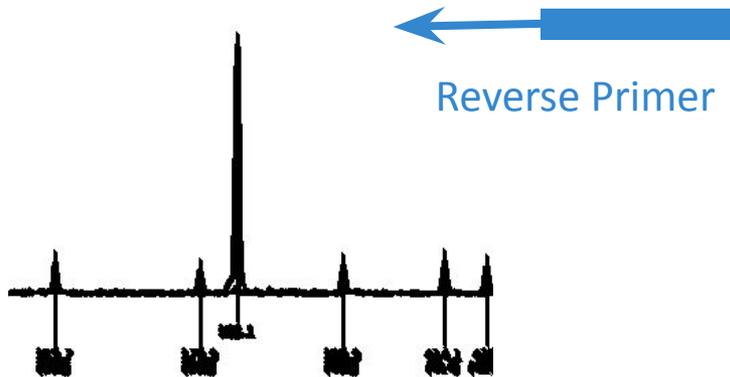
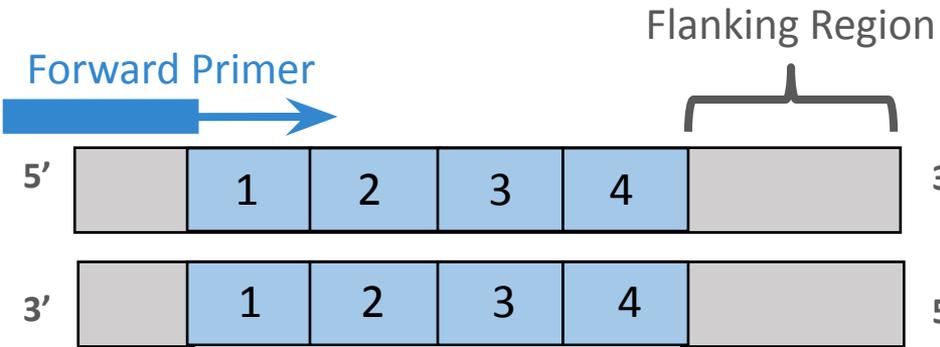
What is a Microsatellite Marker?



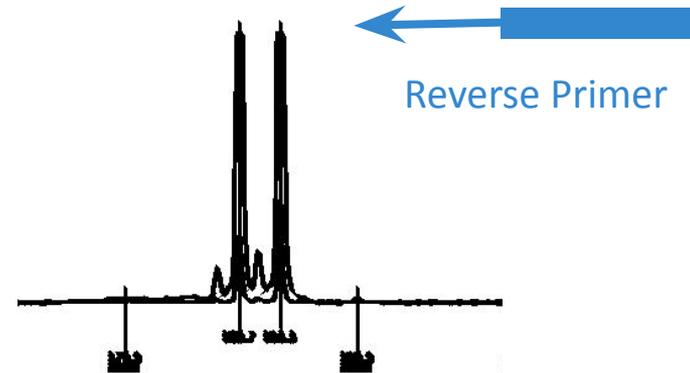
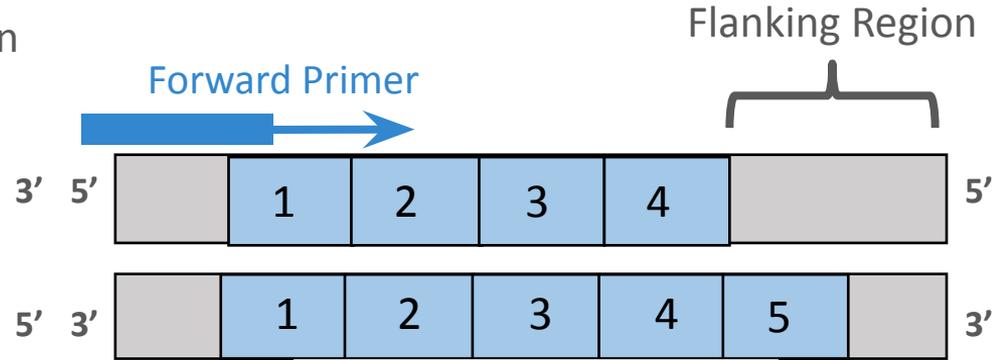
Using Microsatellite Markers to Study Genetic Diversity

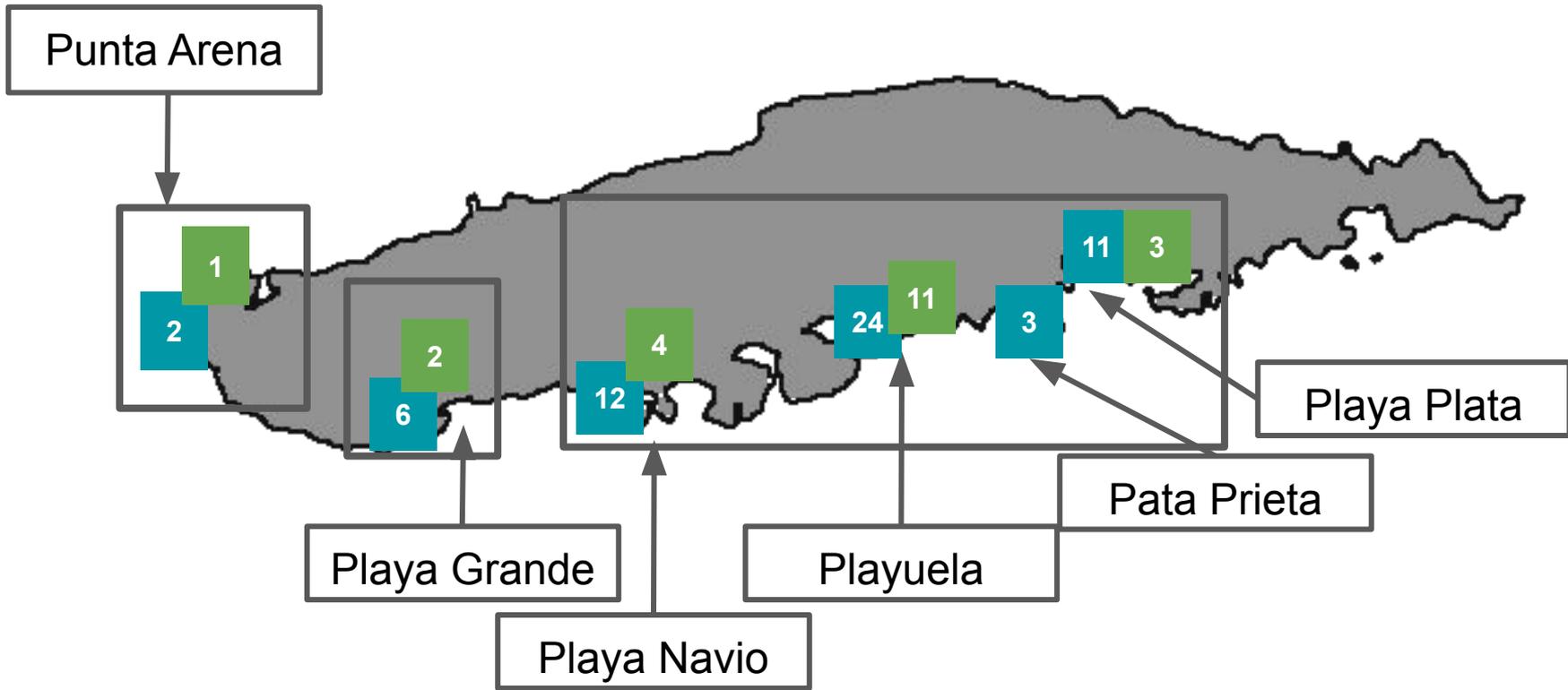


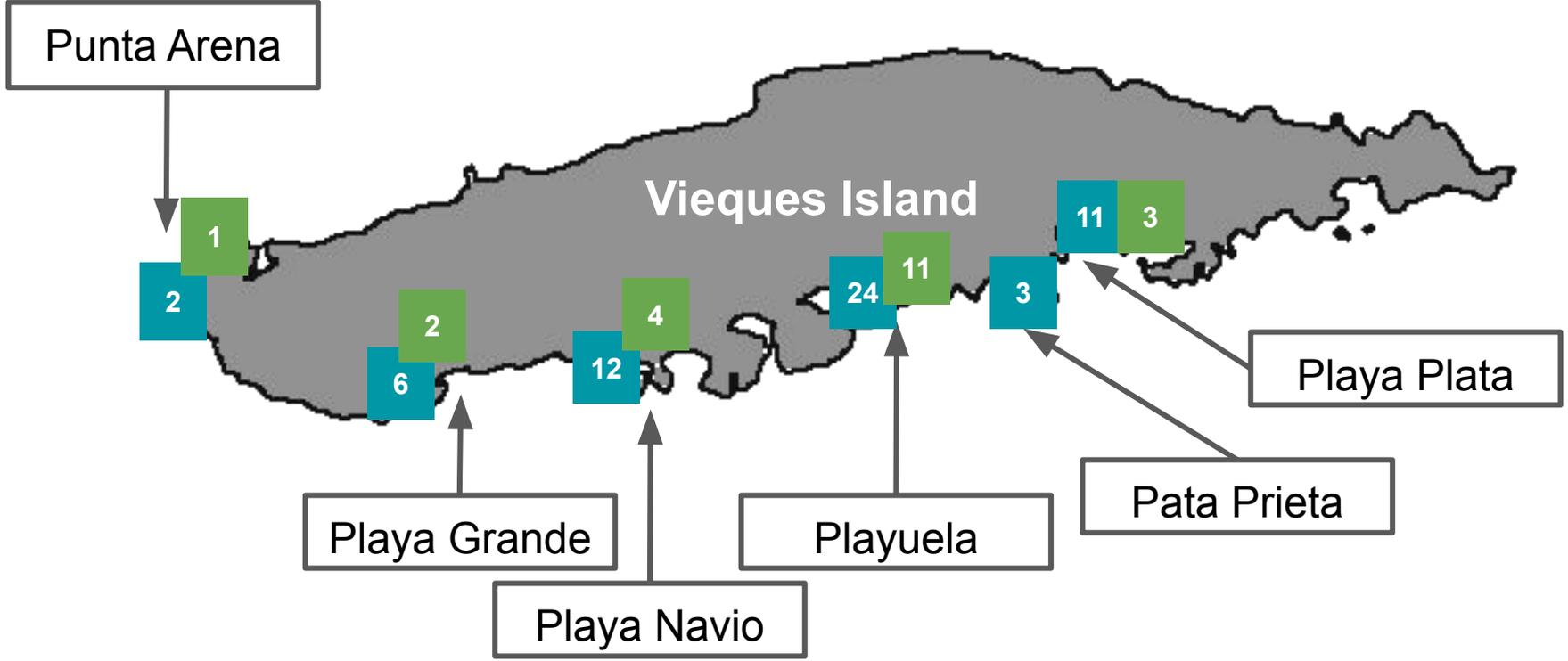
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Heterozygotes

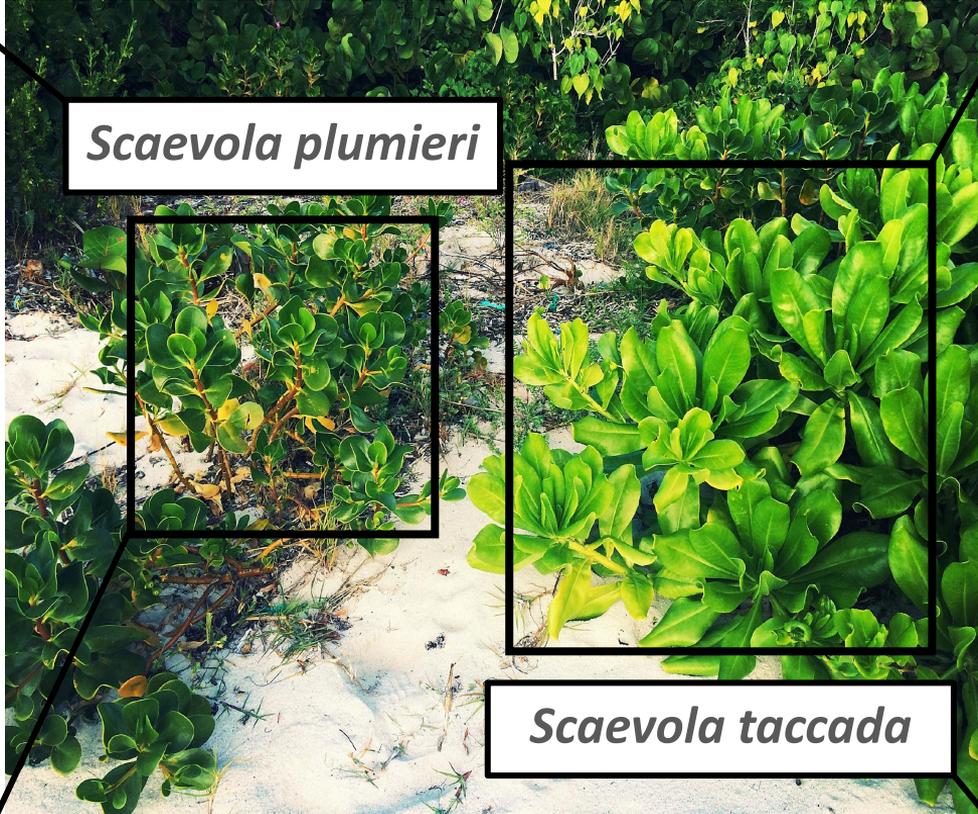








Scaevola plumieri



Scaevola taccada



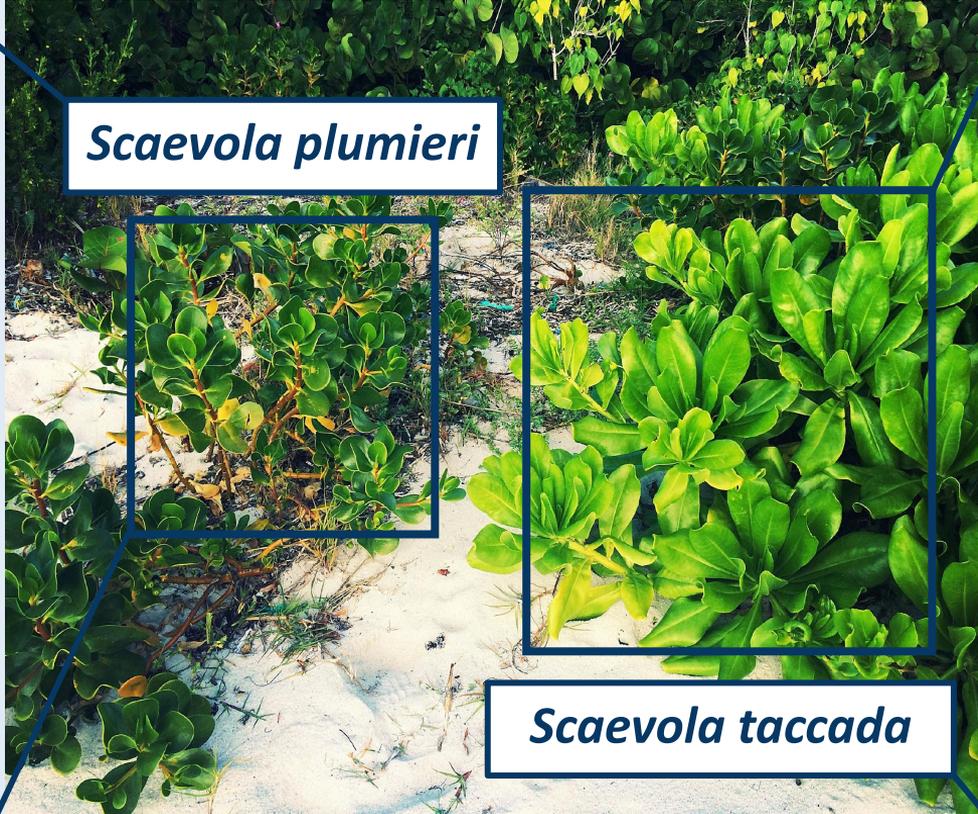
*S. plumieri**S. taccada*

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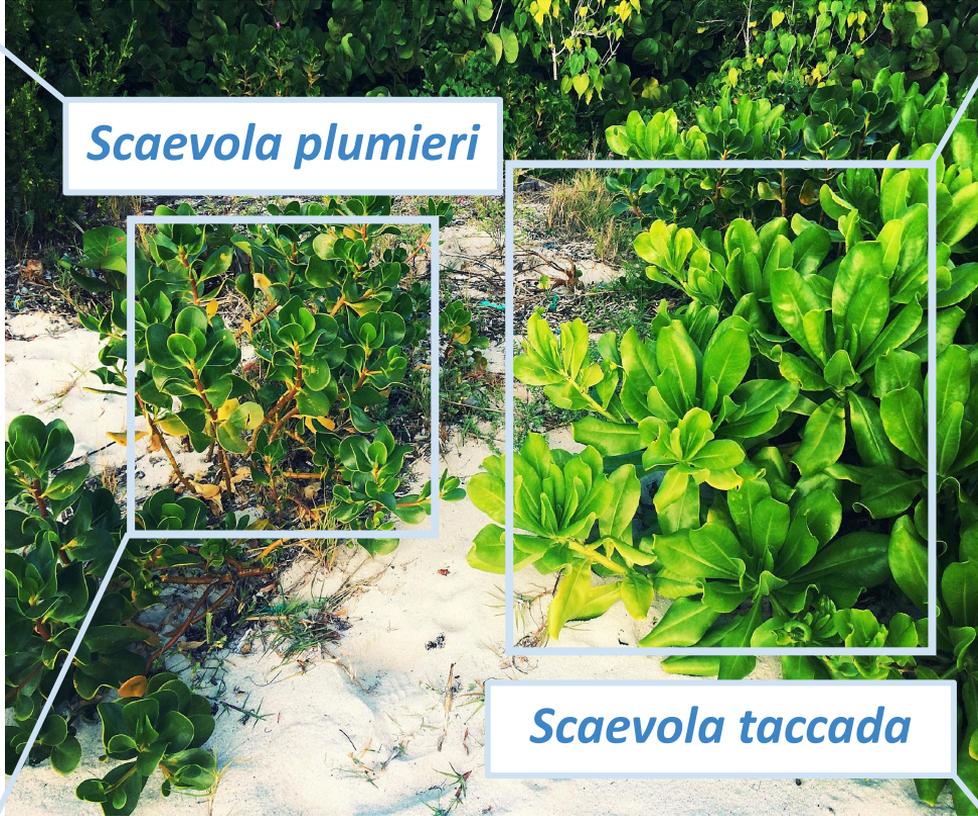


Scaevola taccada





Scaevola plumieri



Scaevola taccada

