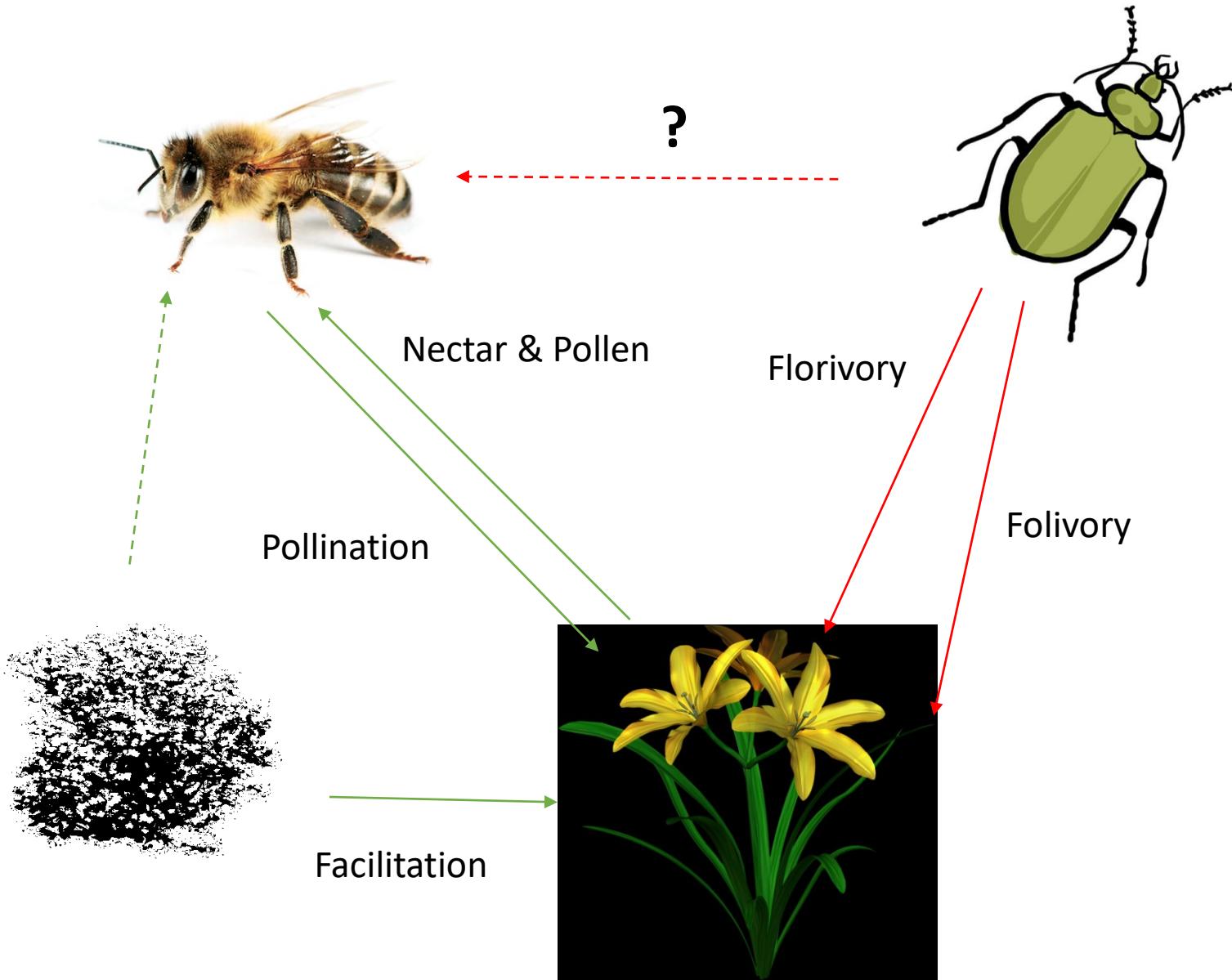


# We Want a Shrubbery! The direct and indirect influence of Shrubs on Flowering Annual plants in an Arid Ecosystem

Stephanie Haas

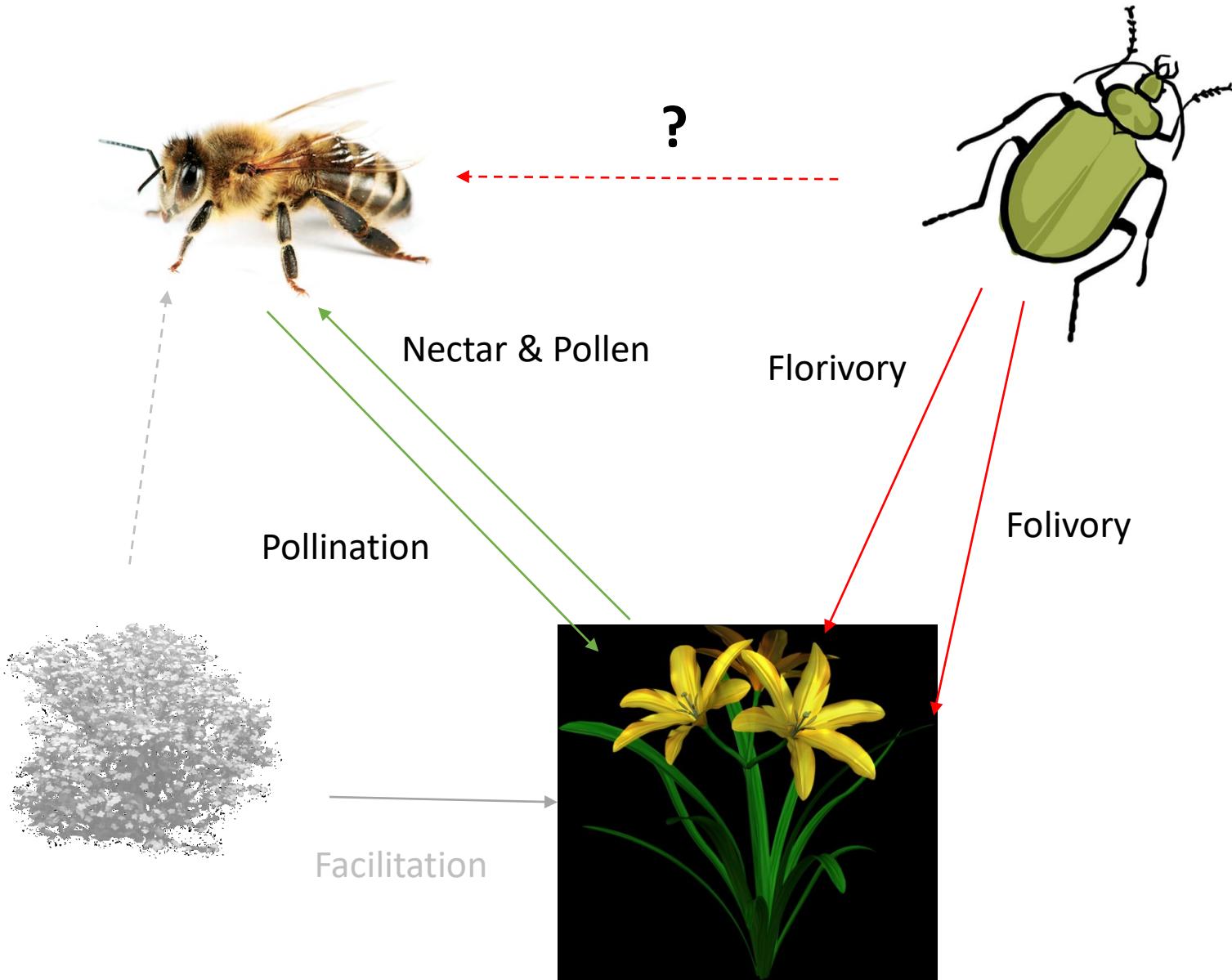


# The direct and indirect influence of Shrubs on Flowering Annual plants in an Arid Ecosystem

	<b>Chapter Title</b>
Chapter 1	Effects of Herbivores on Pollination
Chapter 2	Facilitation and Flowering
Chapter 3	Effects of Herbivores and Pollen Limitation on Facilitation
Chapter 4	Meta Analysis/Data Scrape

# The direct and indirect influence of Shrubs on Flowering Annual plants in an Arid Ecosystem

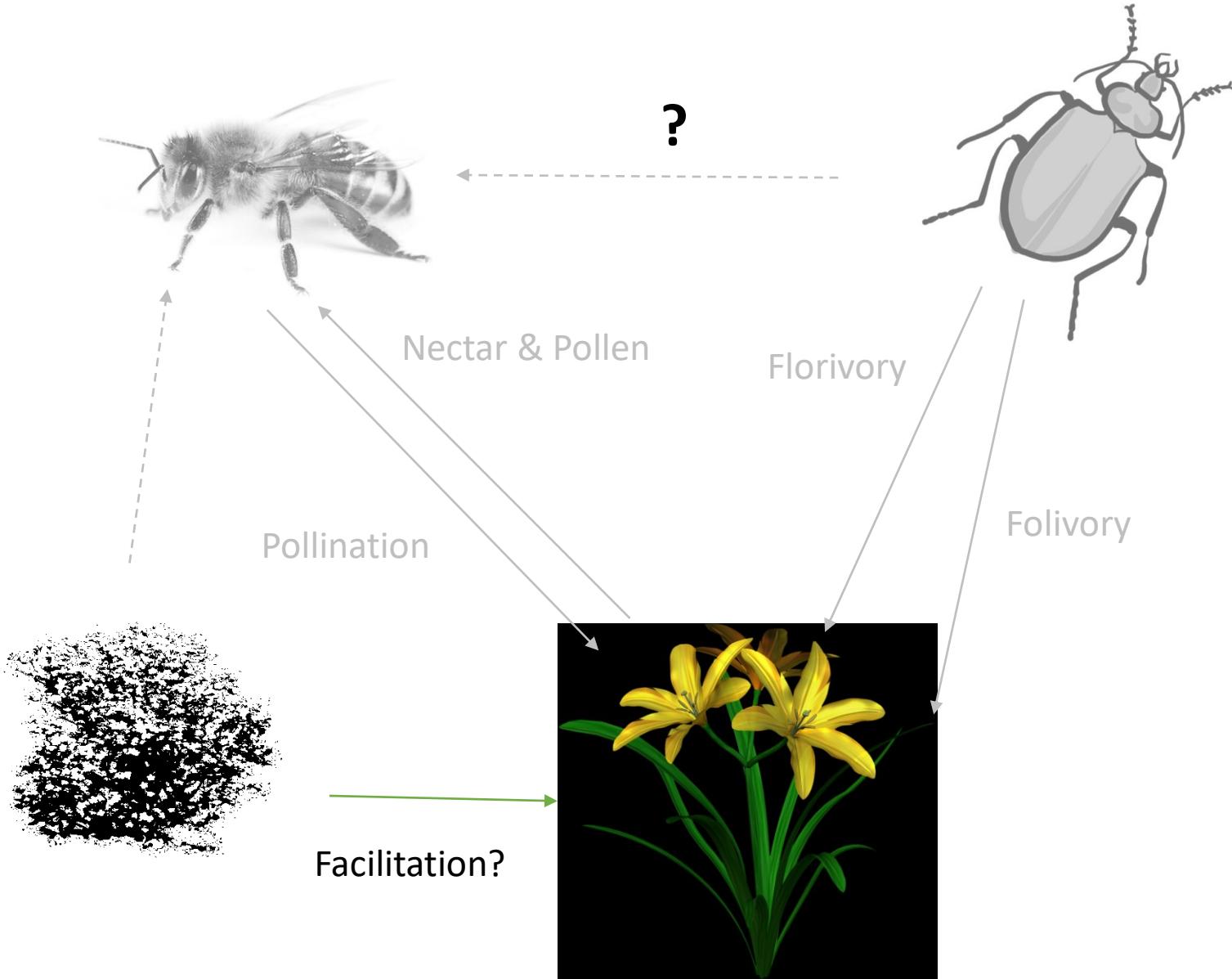
	Chapter Title
Chapter 1	Effects of Herbivores on Pollination
Chapter 2	Facilitation and Flowering
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# Chapter 1: In Review at PeerJ

# The direct and indirect influence of Shrubs on Flowering Annual plants in an Arid Ecosystem

	Chapter Title
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# Plant Facilitation

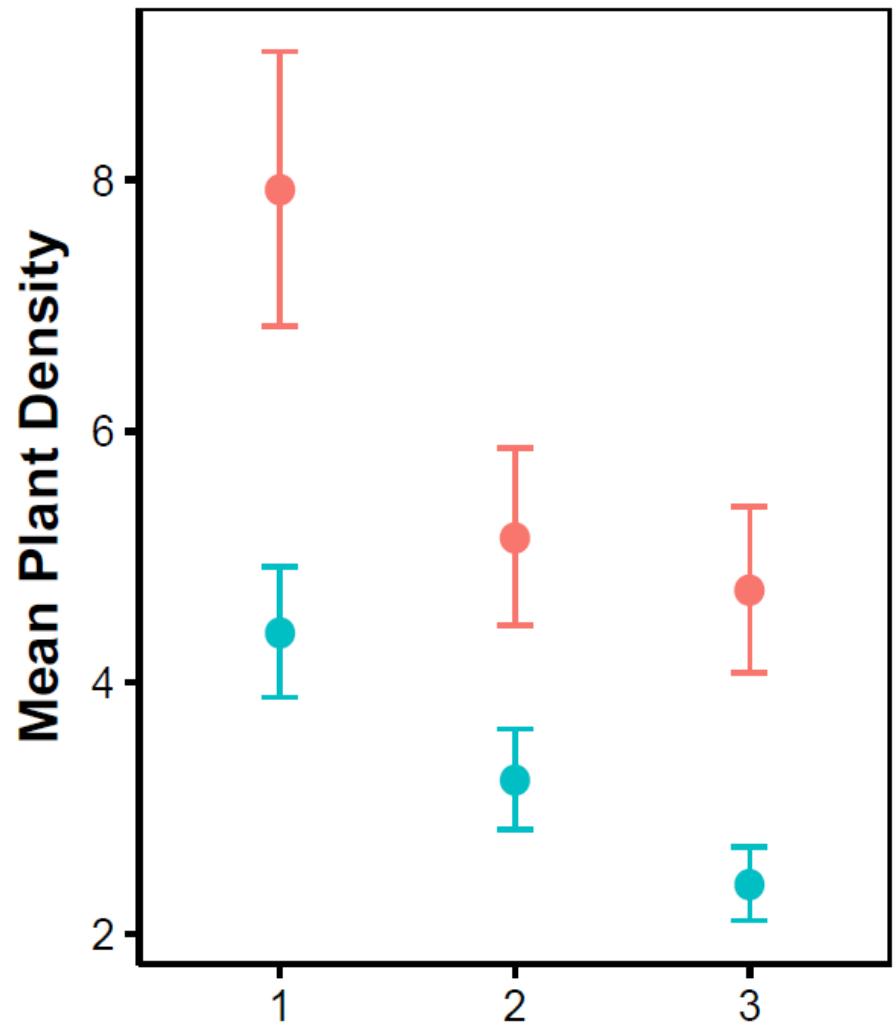


Photo by Alessandro Filazzola

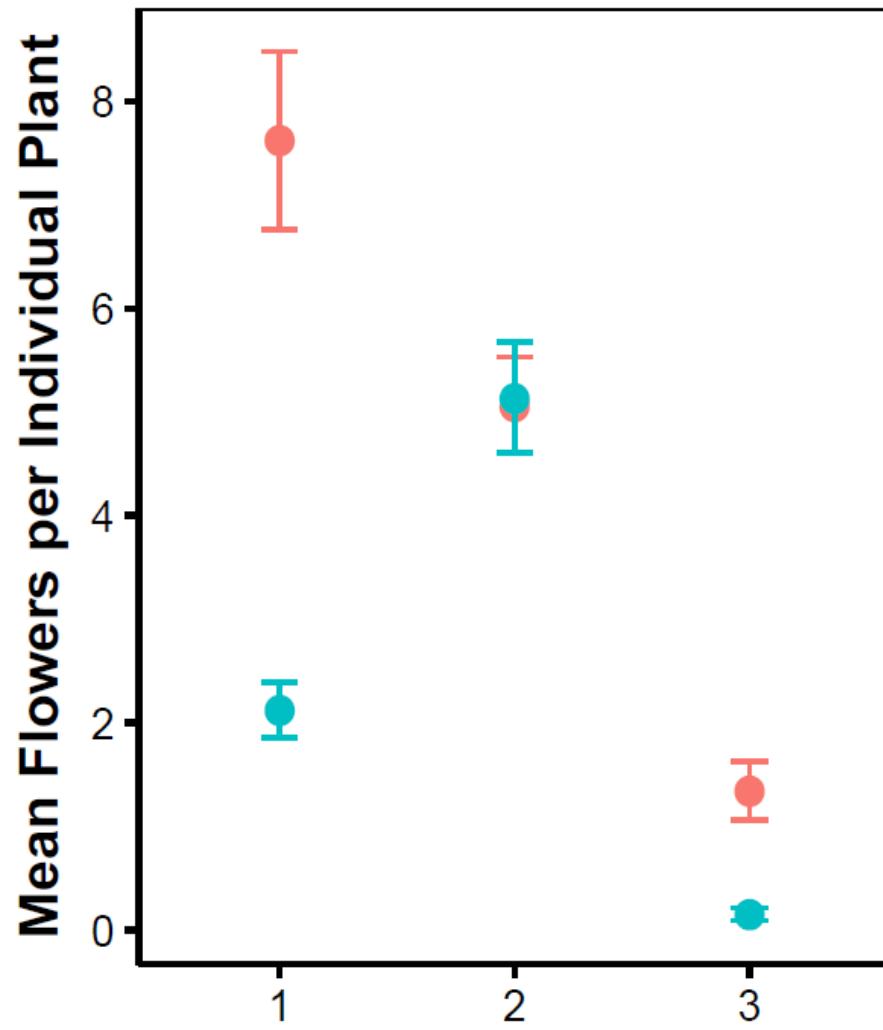
*Larrea tridentata*

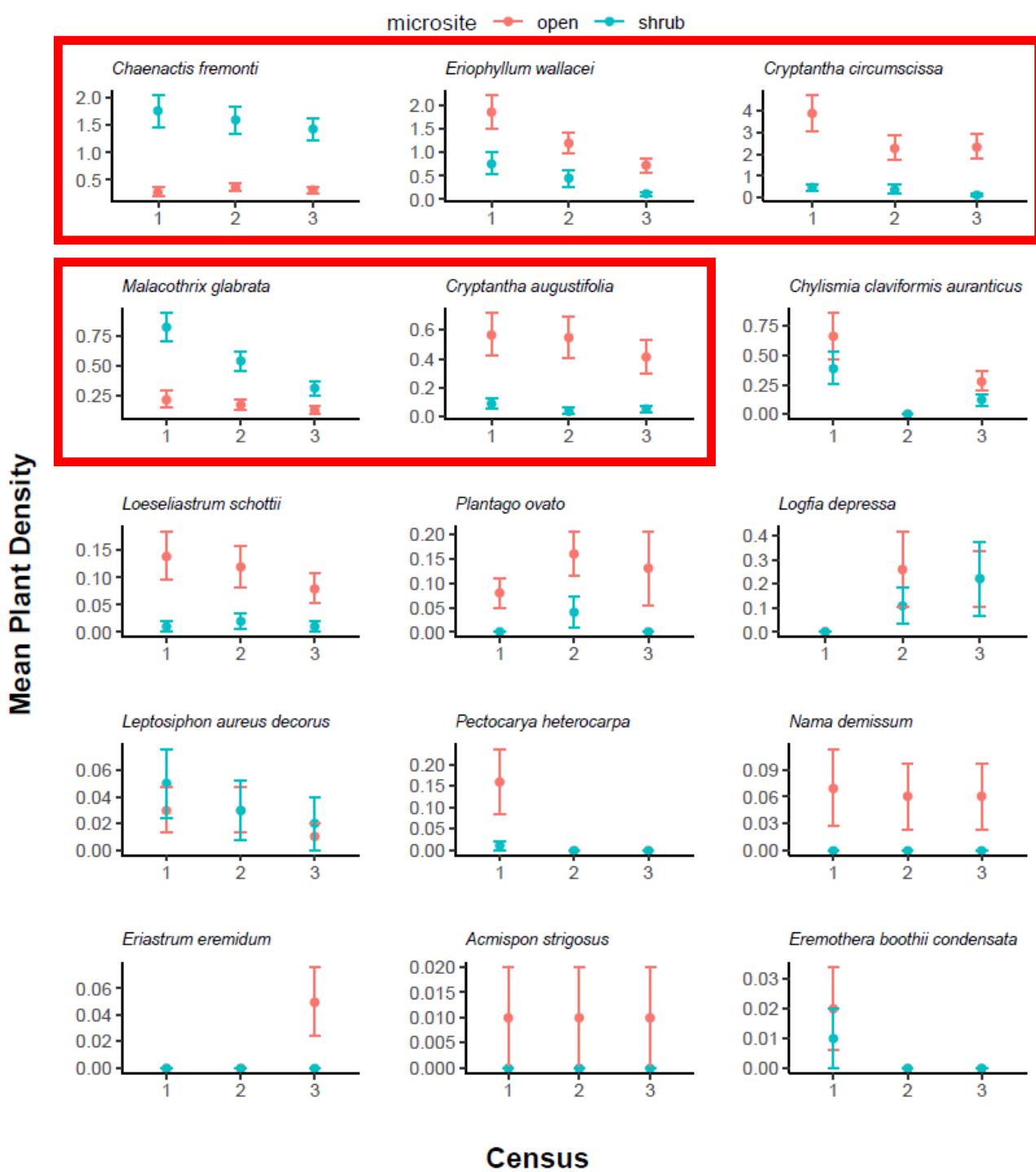


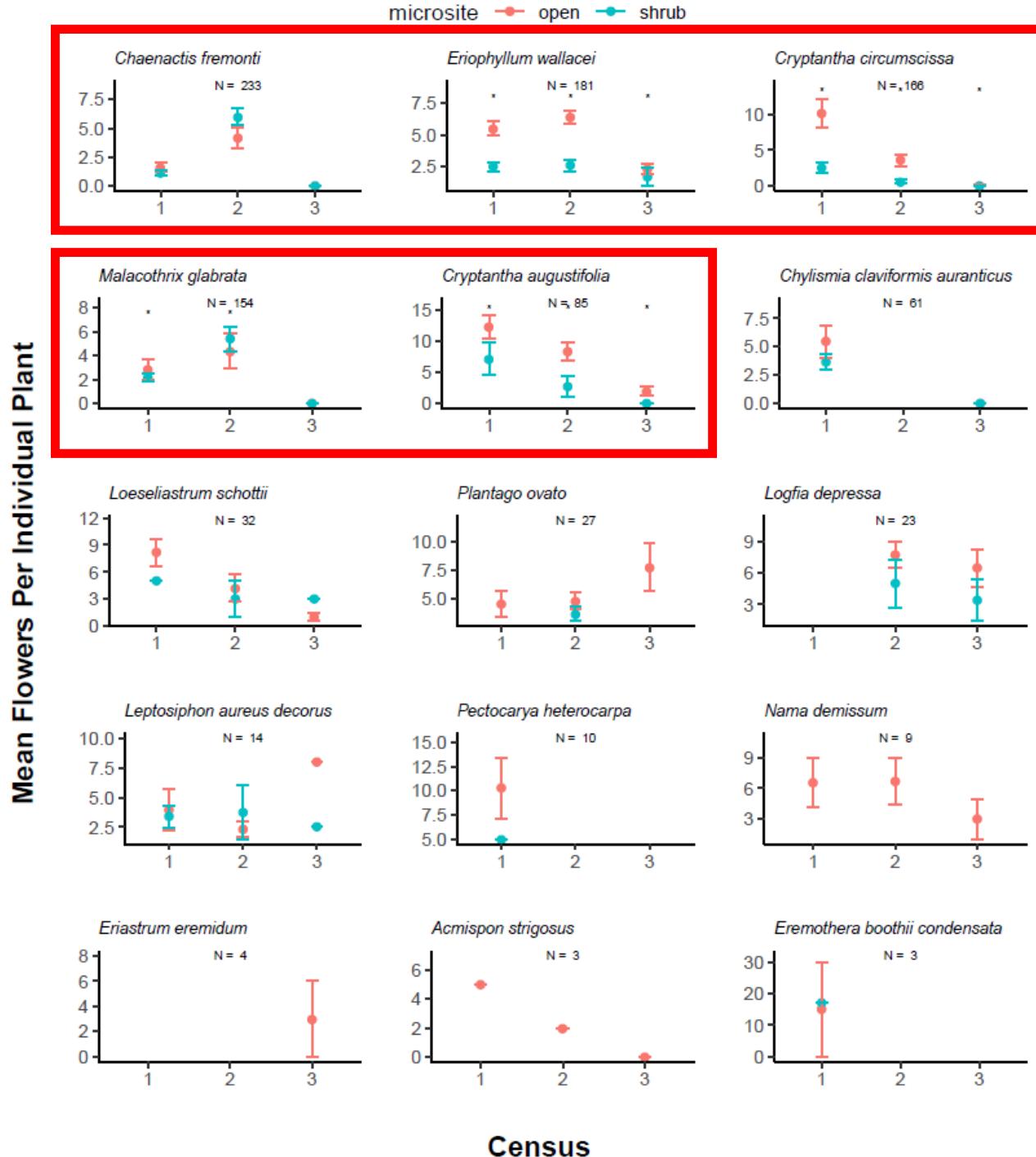
microsite open shrub



Census

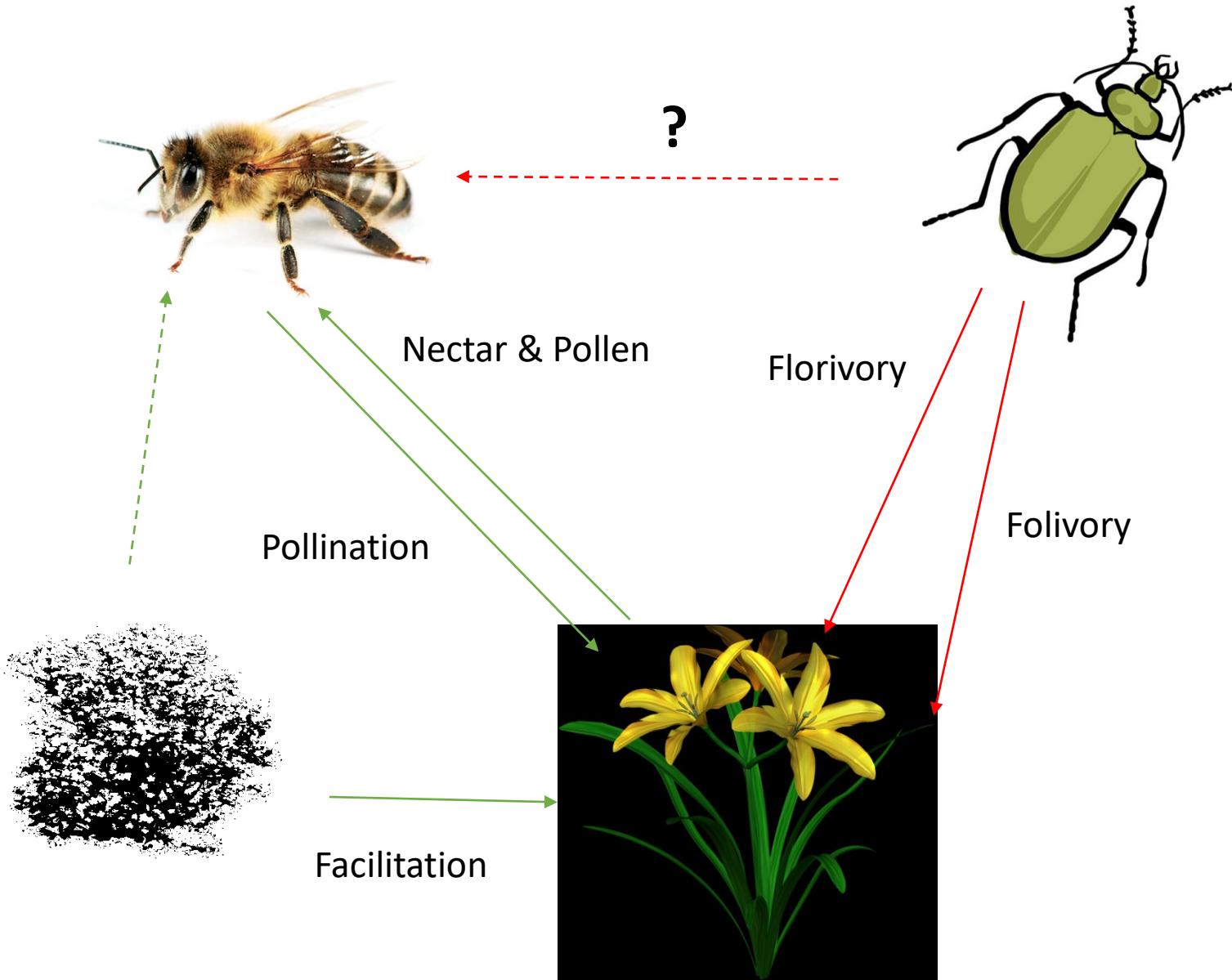




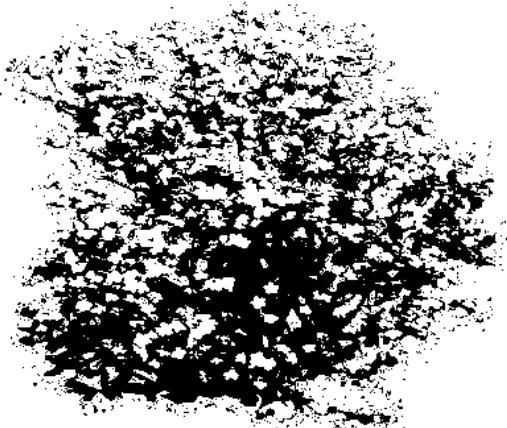


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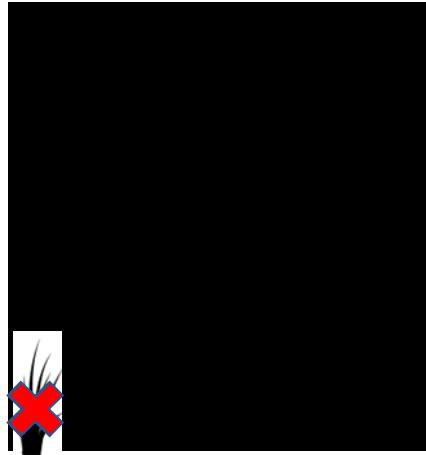
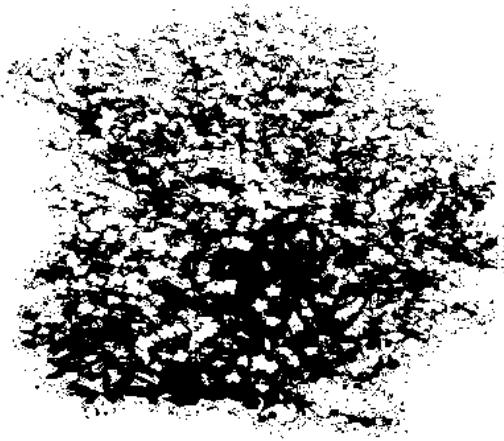


# Compensation for Herbivory



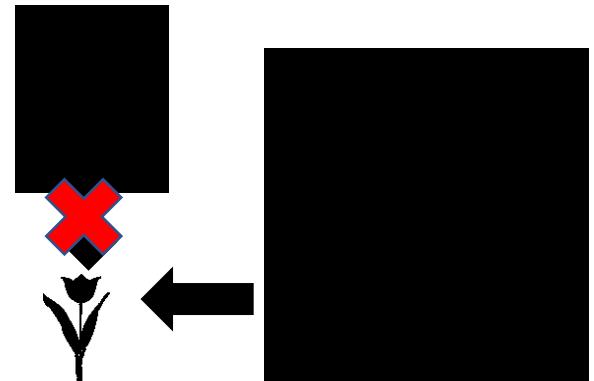
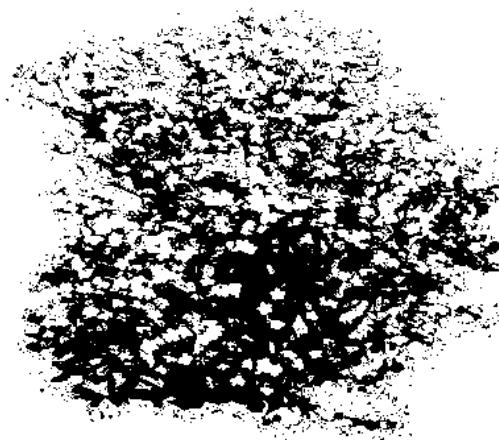
facilitation

...increased resources



Competitive exclusion

# Chapter 3. Effects of Herbivores and Facilitation on Pollination



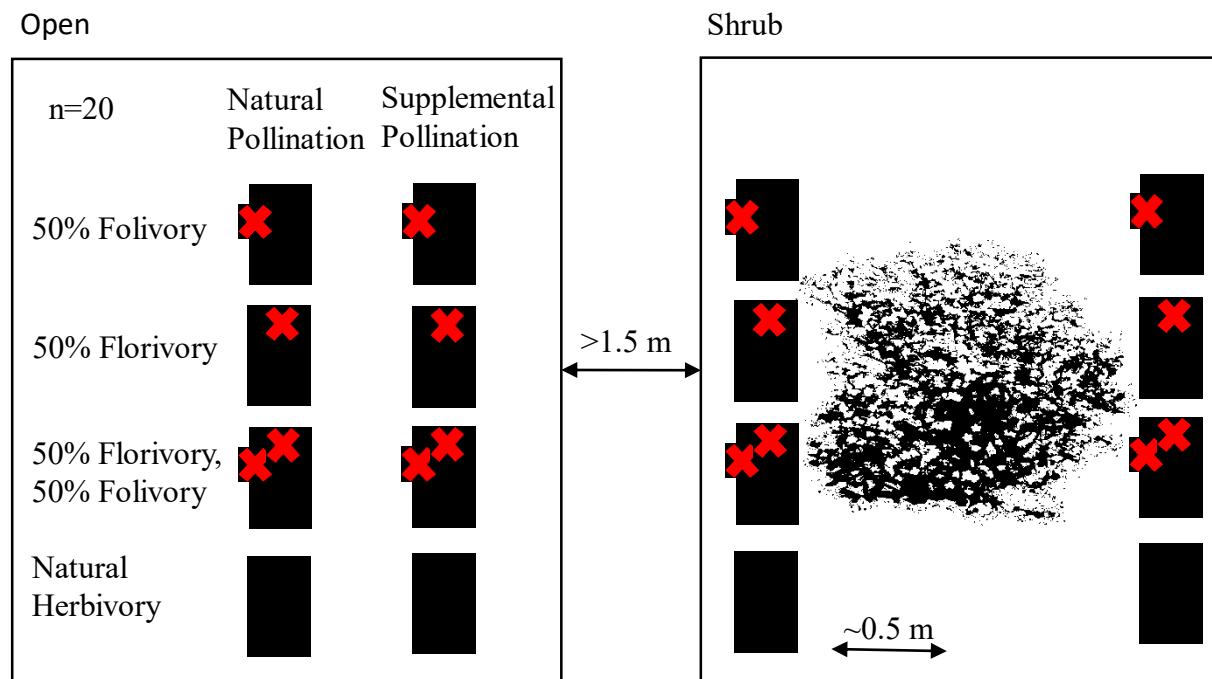
# *Larrea tridentata* and *Malacothrix glabrata*

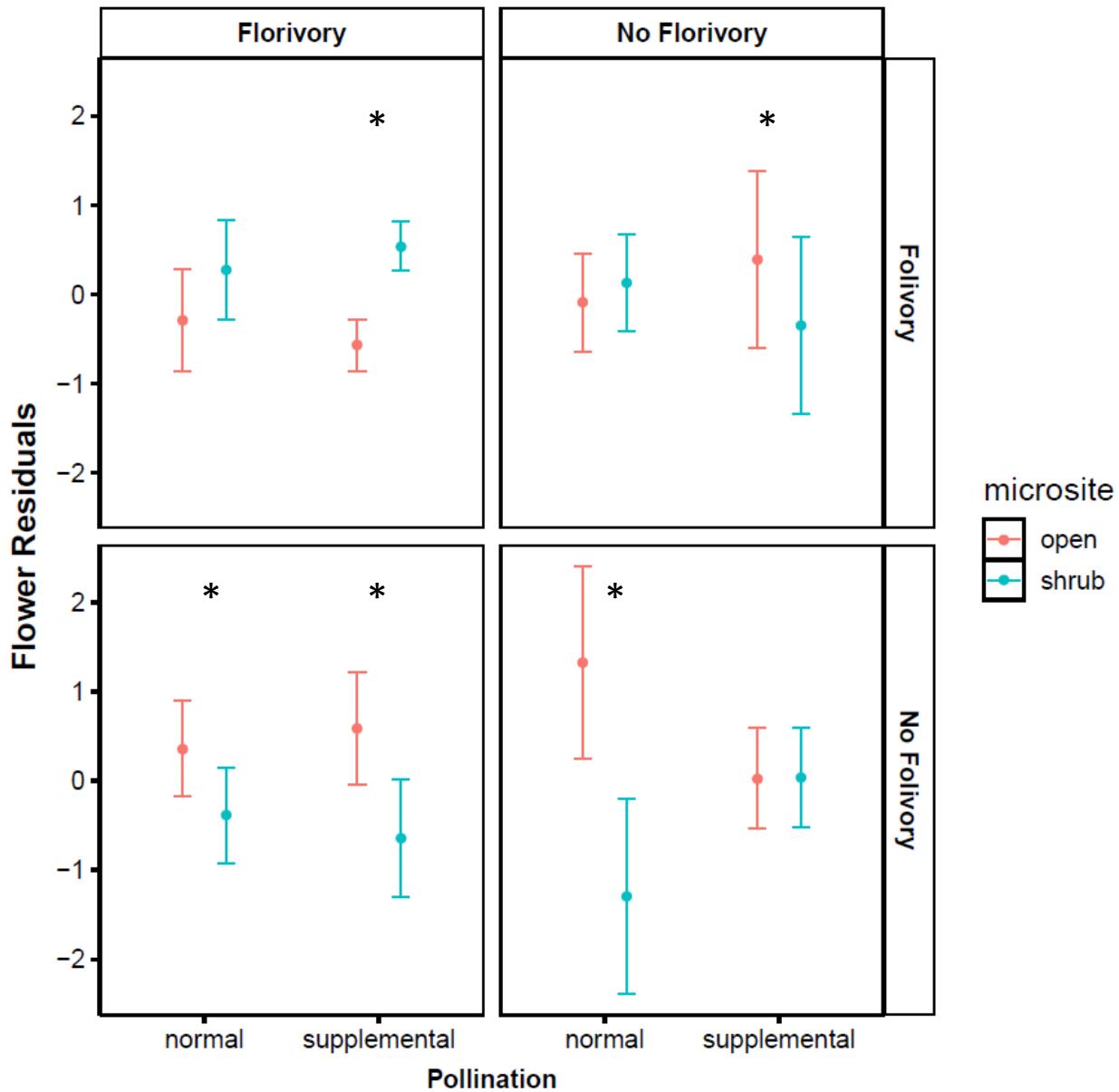


# Chapter 3. Levels of Study

Shrubs	+      -
Herbivory	Folivory      Florivory      Natural
Pollination	Supplemental      Natural

# Chapter 3. Experimental Design





Constant1	Constant2	Constant3	contrast	estimate	SE	t.ratio	p
folivory control	florivory control	normal pollination	open - shrub	1.18	0.605	1.94	0.053
folivory	florivory control	normal pollination	open - shrub	1.01	0.274	3.69	0.0003
folivory control	florivory	normal pollination	open - shrub	0.239	0.325	0.73	0.46
folivory	florivory	normal pollination	open - shrub	-0.693	0.326	-2.12	0.034
folivory control	florivory control	supplemental pollination	open - shrub	1.35	0.334	4.04	0.0001
folivory	florivory control	supplemental pollination	open - shrub	-4.14	0.637	-6.5	<0.0001
folivory control	florivory	supplemental pollination	open - shrub	0.929	0.313	2.97	0.0032
folivory	florivory	supplemental pollination	open - shrub	0.2	0.369	0.54	0.59
folivory control	florivory control	open	normal-supplemental	-0.471	0.417	-1.13	0.26
folivory	florivory control	open	normal-supplemental	0.7	0.313	2.24	0.026
folivory control	florivory	open	normal-supplemental	0.586	0.369	1.59	0.11
folivory	florivory	open	normal-supplemental	0.025	0.281	0.089	0.93
folivory control	florivory control	shrub	normal-supplemental	-0.297	0.284	-1.04	0.3
folivory	florivory control	shrub	normal-supplemental	-4.45	0.738	-6.03	<0.0001
folivory control	florivory	shrub	normal-supplemental	1.276	0.381	3.35	0.0009
folivory	florivory	shrub	normal-supplemental	0.918	0.356	2.58	0.01
folivory control	open	normal pollination	control - florivory	0.296	0.293	1.01	0.31
folivory	open	normal pollination	control - florivory	-0.00904	0.31	-0.029	0.98
folivory control	shrub	normal pollination	control - florivory	-0.639	0.399	-1.6	0.11
folivory	shrub	normal pollination	control - florivory	-1.71	0.296	-5.79	<0.0001
folivory control	open	supplemental pollination	control - florivory	1.35	0.327	4.13	<0.0001
folivory	open	supplemental pollination	control - florivory	-0.684	0.301	-2.27	0.024
folivory control	shrub	supplemental pollination	control - florivory	0.933	0.319	2.92	0.0037
folivory	shrub	supplemental pollination	control - florivory	3.66	0.903	4.05	0.0001
florivory control	open	normal pollination	control - folivory	0.869	0.465	1.87	0.063
florivory	open	normal pollination	control - folivory	0.563	0.403	1.4	0.16
florivory control	shrub	normal pollination	control - folivory	0.705	0.282	2.5	0.013
florivory	shrub	normal pollination	control - folivory	-0.369	0.409	-0.901	0.37
florivory control	open	supplemental pollination	control - folivory	2.04	0.331	6.17	<0.0001
florivory	open	supplemental pollination	control - folivory	0.00318	0.236	0.014	0.99
florivory control	shrub	supplemental pollination	control - folivory	-3.45	0.74	-4.67	<0.0001
florivory	shrub	supplemental pollination	control - folivory	-0.727	0.42	-1.73	0.084

# In the Greenhouse



# Timeline

Date	Activity	Chapter
March-April 2020	Edits and submission/review of first and second chapter	CH1, CH2
April 2020 – Mar 2021	Meta-Analysis/data scrape	CH4
Sep 2020 - Mar 2021	Greenhouse clipping experiment	CH3
Mar – May 2021	Statistics and finalization of manuscript for greenhouse data	CH3
Mar-August 2021	Wrapping up of thesis (writing/editing/defense)	CH1, CH2, CH3, CH4