

The effects of mutualism on trait evolution - Residuals from ClimPC

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Analyses accounting for climate

The results below follow the same rationale as the ones from the main document. However, in the cases below all analyses use the plant traits already accounted for climatic effects by using the residuals from the regressions between each trait and the first three Principal Components of the climatic variables obtained from BioClim (REF).

Methods

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## here() starts at /docs/Documents/hydnoants
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MCC tree

- 1000 reconstructions of each discrete trait (namely Mutualistic Strategy, Presence of Warts, Presence of Reward, Plant Architecture, Domatium growth type, Mating System, Leaf Structure and Presence of appendages)
- Sampled 100 reconstructions and performed continuous trait evolution analysis (Stem Area, Leaf Area, Corolla Length and Petiole Length) using residuals of correlations between continuous traits and the first 3 climatic PCs.
- Fitted 7 models:
 - Single-rate Brownian Motion (BM1 - 1 parameter)
 - Multiple-rate Brownian Motion (BMS - 3 parameters)
 - Simple OU (OU1 - 3 parameters)
 - OU with different optima but same alpha and sigma (OUM - 5 parameters)
 - OU with different optima and alpha but same sigma (OUMA - 7 parameters)
 - OU with different optima and sigma but same alpha (OUMV - 7 parameters)
 - OU with different optima, alpha, and sigma (OUMVA - 9 parameters)

Summary of Results

Due to the elevated number of variables and models, we opted to use a model averaging approach by calculating the weighted average of parameter values. The final value of each parameter was calculated by multiplying the estimated value for a given parameter in a given model by the Akaike weight of the given model. Thus, we need not resort to any arbitrary criterium (such as $\delta\text{AIC} > 2$) and can evaluate the dynamics solely based on the parameter values. All plots below were filtered to exclude parameter values that were larger than $-10 (e^{-10})$ and smaller than $10 (e^{10})$, on the justification of representing bad fitting or unreasonable biological meaning.

Residuals from climatic PCs

Most tested correlations between each continuous trait and the climatic PC were non-significant regardless of accounting or not for the phylogenetic structuring of the residuals. The only trait that showed significant correlations to both climatic PC1 and PC2 was “Hole Diameter”, and therefore will be the only trait for which we will consider the parameter values for both climatic PCs. For practical purposes, the results for all PCs should be virtually identical for all other continuous traits, and therefore we will only analyse the results for the PC1.

Appendages

Species with “variable” appendages show increased θ values for corola length, leaf area, petiole length and stem area when compared to the other states.

Species with “spines” have intermediate θ values for petiole length and stem area.

On the other hand, species with no appendages undergo stronger selection for hole diameter (for both PC1 and PC2), leaf area, and stem area when compared to other states, with also faster evolutionary rates for corola length, petiole length and stem area.

Species with “variable” appendages undergo intermediate selection for leaf and stem area when compared to other states.

Architecture

Species with single stems evolve towards higher θ values for all traits. Conversely, species with multiple stems show higher high α values for corolla length, hole diameter (for both PC1 and PC2), leaf area and petiole length, but not for stem area. Also, σ^2 is higher in species with multiple stems for all traits but hole diameter.

Domatium Growth

Species with apical growth show higher θ values for corolla length, leaf and stem area and petiole length. For α values, species with apical growth show higher values for corolla length and stem area, whereas species with diffuse growth show higher values for hole diameter and petiole length. Regarding σ^2 , species with diffuse growth show higher values for all traits.

Species with diffuse growth show higher values of both θ , α and σ^2 for both PC1 and PC2.

Leaf Structure

Species with thin leaves have higher values of θ for hole diameter, leaf area, and stem area, whereas species with variable leaf structure have higher values of corolla length and petiole length. Species with thick leaves show higher α values for corolla length, hole diameter and leaf area, and succulent species for petiole length and stem area.

For σ^2 , species with succulent leaves have higher values for corolla and petiole length, whereas species with thick leaves show higher values for leaf and stem area.

Mating System

All differences in parameters for mating system were discrete, being hard to find any pattern.

Reward

Species that give rewards show higher θ values for all traits but hole diameter, for which the signal is mixed (both in PC1 and PC2). Also, these species show higher α values for all traits, and higher σ^2 for all traits but hole diameter (both in PC1 and PC2).

Strategy

Species that are obligate mutualistics show higher values of θ for all traits but hole diameter, for which species that lost this interaction have higher hole diameters than other species for PC1, and the facultative ones for PC2. On the other hand, species that are facultatively mutualistic show higher α values for corolla length, hole diameter (for both PC1 and PC2) and petiole length, whereas for leaf area the higher α values are from species who lost this interaction, and for stem area the higher are obligate mutualists.

For σ^2 , facultative species show higher values for all traits but leaf area, for which species that lost the interaction show higher values.

Warts

Species with differentiated warts have higher θ and σ^2 values for all traits but hole diameter, for which higher values belong to species that lost this structure (whereas for PC2 higher values are for species with variable warts). For α , species with variable warts show higher values for hole diameter and petiole length, whereas species who lost these structures show higher values for leaf and stem area.

Figures and tables

Appendages

PC1 - Parameters

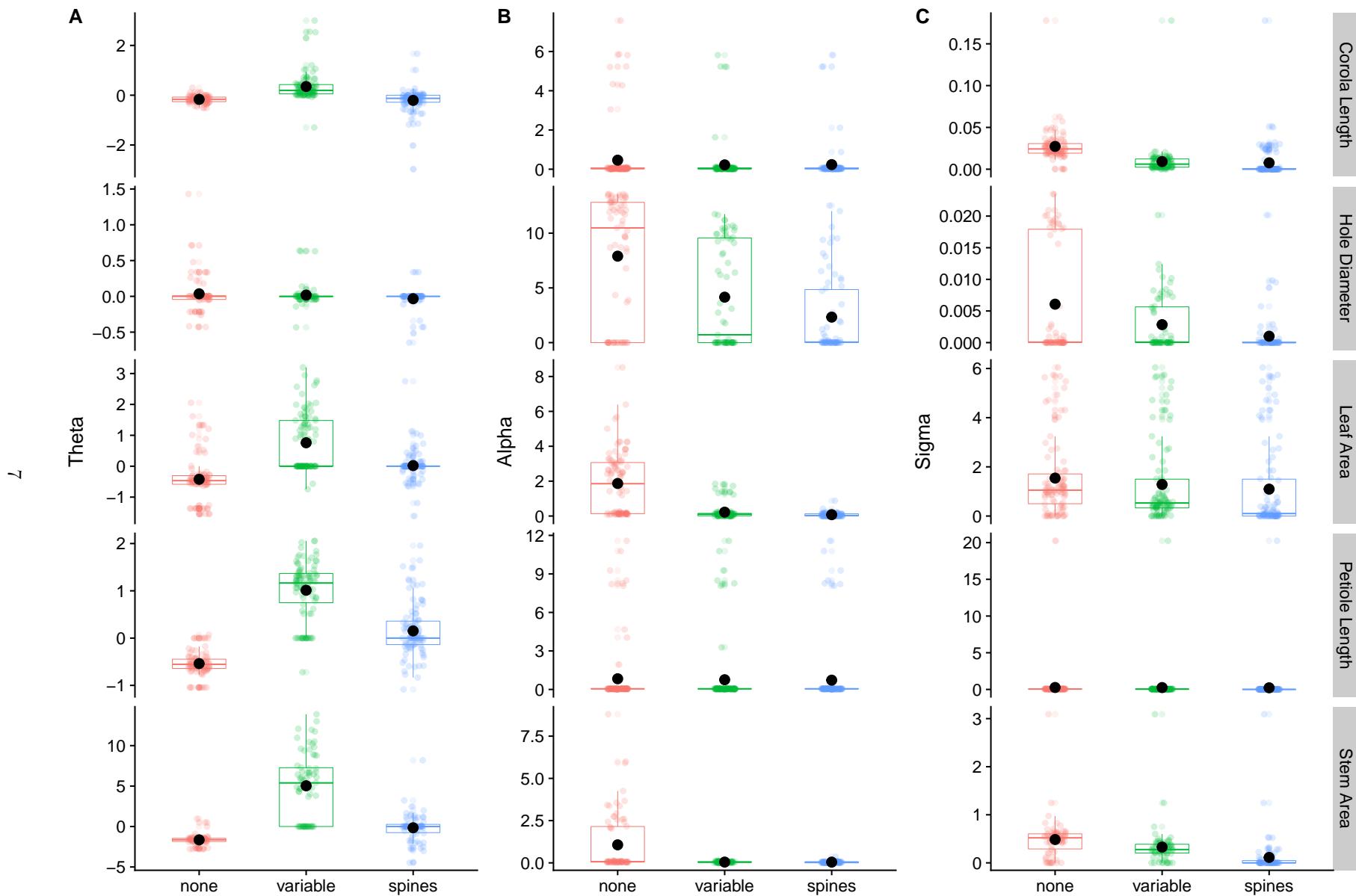


Figure 1: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Appendage.

PC1 - Parameter differences

Table 1: Differences in Theta values for PC1 analysis of Appendages. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines
none	0	7	52	0	33	36	0	15	25	0	2	8	0	3	17
variable	90	0	88	34	0	24	79	0	52	93	0	79	67	0	51
spines	45	3	0	31	24	0	69	3	0	87	7	0	53	1	0

Table 2: Differences in Alpha values for PC1 analysis of Appendages. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

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	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines
none	0	5	5	0	44	48	0	71	77	0	4	3	0	37	43
variable	7	0	2	5	0	31	5	0	64	0	0	1	3	0	35
spines	8	11	0	1	18	0	0	13	0	1	3	0	0	6	0

Table 3: Differences in Sigma values for PC1 analysis of Appendages. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines
none	0	91	76	0	19	19	0	41	41	0	71	74	0	47	49
variable	1	0	72	0	0	16	0	0	39	20	0	65	2	0	48
spines	16	20	0	0	3	0	0	2	0	17	24	0	0	1	0

PC2 - Parameters

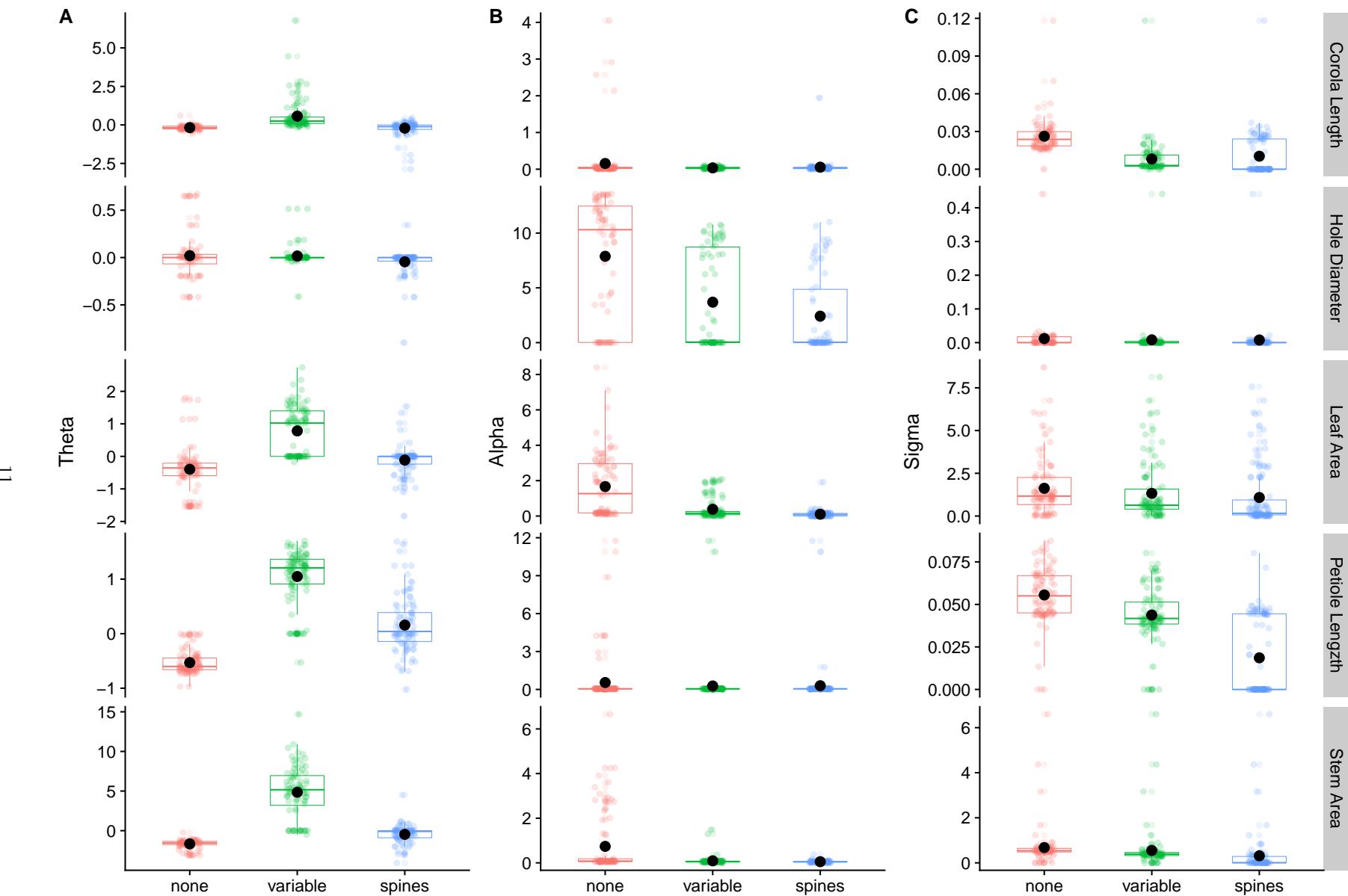


Figure 2: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Appendage.

PC2 - Parameter differences

Table 4: Differences in Theta values for PC2 analysis of Appendages. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines
none	0	3	45	0	34	37	0	8	29	0	0	4	0	0	14
variable	94	0	85	39	0	27	86	0	57	99	0	88	84	0	69
spines	52	11	0	36	23	0	65	7	0	95	5	0	70	3	0

Table 5: Differences in Alpha values for PC2 analysis of Appendages. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines
none	0	4	4	0	53	54	0	75	84	0	6	6	0	46	52
variable	12	0	3	1	0	35	8	0	78	0	0	2	6	0	44
spines	14	15	0	0	19	0	0	6	0	0	4	0	0	8	0

Table 6: Differences in Sigma values for PC2 analysis of Appendages. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines
none	0	89	64	0	19	19	0	46	46	0	78	69	0	63	65
variable	4	0	60	0	0	12	0	0	44	15	0	58	2	0	64
spines	29	33	0	0	7	0	0	2	0	24	35	0	0	1	0

PC3 - Parameters

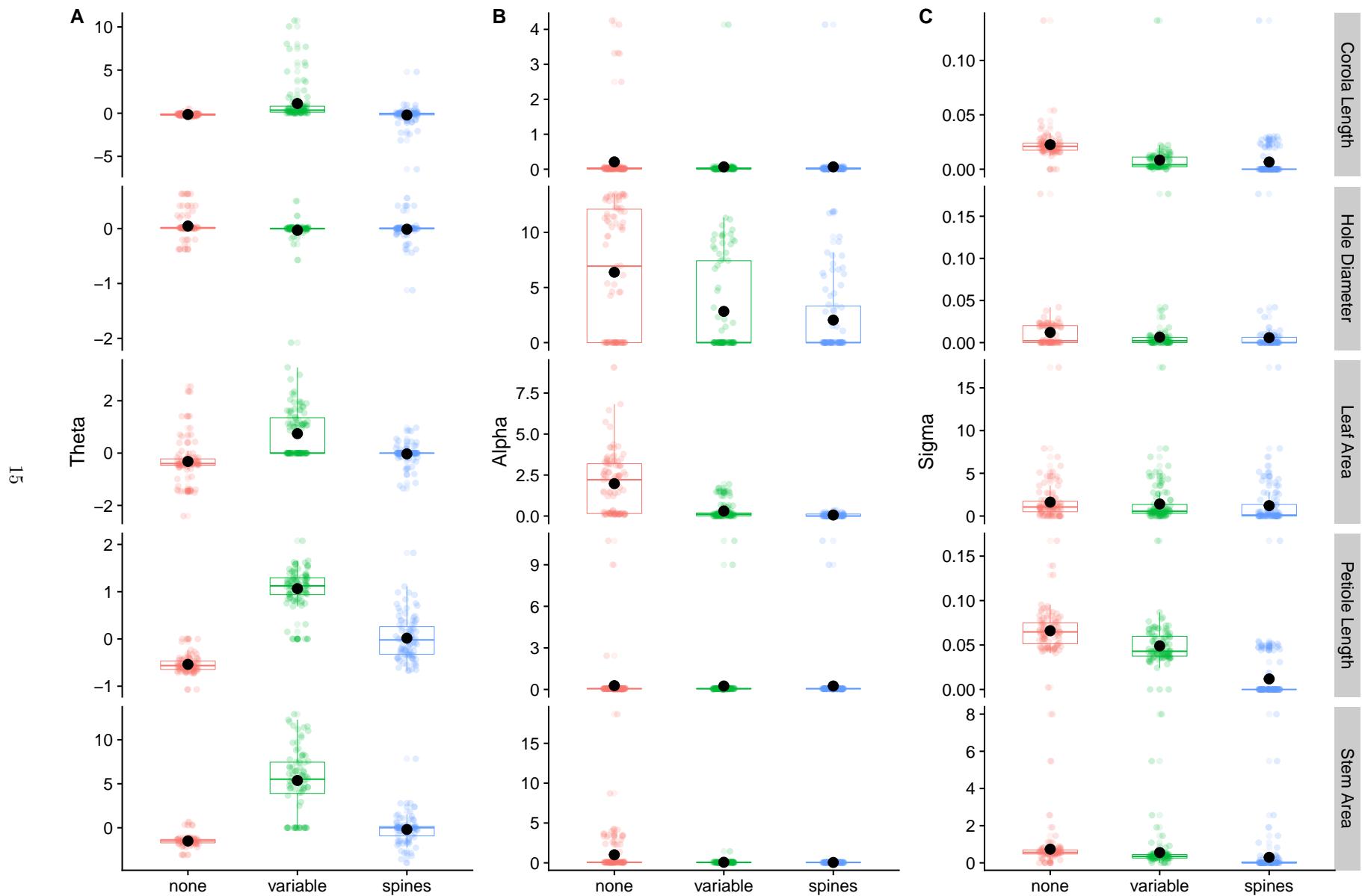


Figure 3: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Appendage.

PC3 - Parameter differences

Table 7: Differences in Theta values for PC3 analysis of Appendages. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines
none	0	3	39	0	57	49	0	14	23	0	0	5	0	4	22
variable	91	0	87	24	0	37	83	0	53	100	0	95	80	0	66
spines	55	3	0	32	33	0	74	1	0	95	2	0	62	2	0

Table 8: Differences in Alpha values for PC3 analysis of Appendages. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines
none	0	5	4	0	47	50	0	72	78	0	1	1	0	43	47
variable	9	0	2	6	0	28	6	0	71	0	0	0	4	0	42
spines	12	14	0	3	24	0	0	7	0	0	1	0	0	4	0

Table 9: Differences in Sigma values for PC3 analysis of Appendages. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines
none	0	87	73	0	30	30	0	40	40	0	85	81	0	61	65
variable	3	0	70	0	0	16	0	0	40	14	0	79	4	0	65
spines	17	20	0	0	14	0	0	0	0	18	20	0	0	0	0

Architecture

PC1 - Parameters

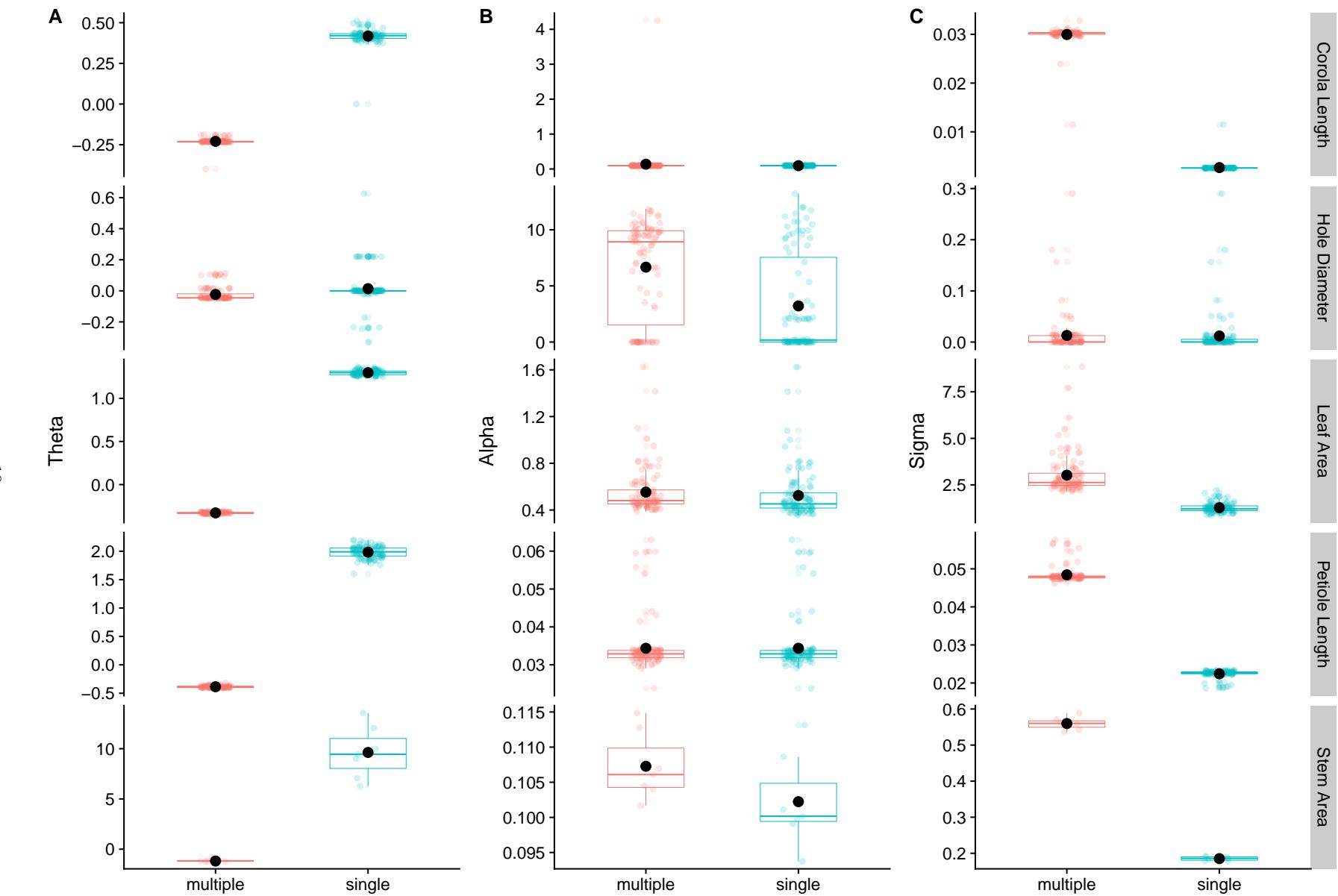


Figure 4: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Architecture.

PC1 - Parameter differences

Table 10: Differences in Theta values for PC1 analysis of Architecture. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	multiple	single	multiple	single	multiple	single	multiple	single	multiple	single
multiple	0	0	0	17	0	0	0	0	0	0
single	100	0	78	0	100	0	100	0	7	0

Table 11: Differences in Alpha values for PC1 analysis of Architecture. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

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	Corolla Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	multiple	single	multiple	single	multiple	single	multiple	single	multiple	single
multiple	0	1	0	58	0	100	0	0	0	7
single	0	0	25	0	0	0	0	0	0	0

Table 12: Differences in Sigma values for PC1 analysis of Architecture. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

PC2 - Parameters

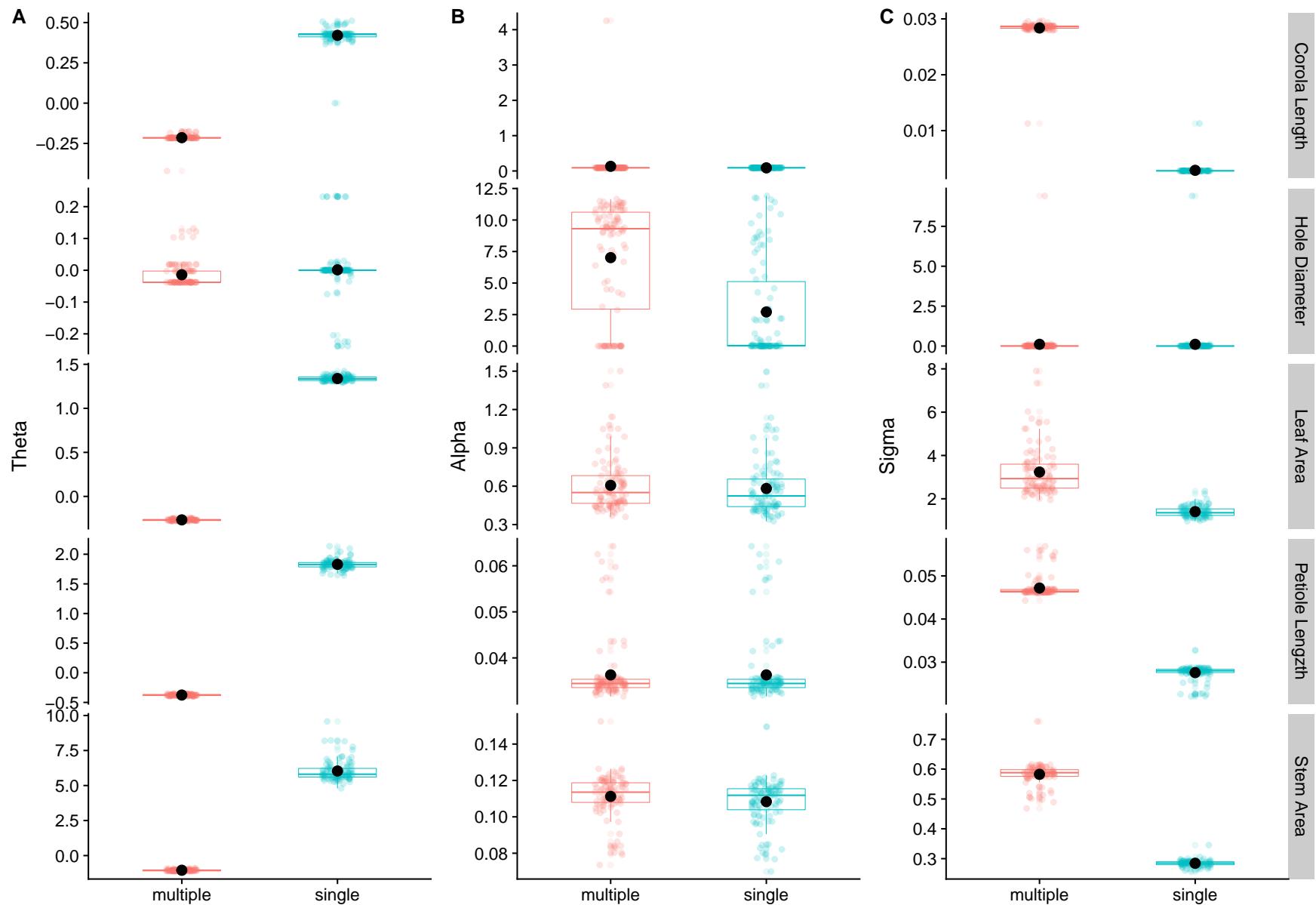


Figure 5: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Architecture.

PC2 - Parameter differences

Table 13: Differences in Theta values for PC2 analysis of Architecture. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	multiple	single	multiple	single	multiple	single	multiple	single	multiple	single
multiple	0	0	0	20	0	0	0	0	0	0
single	100	0	78	0	100	0	100	0	100	0

Table 14: Differences in Alpha values for PC2 analysis of Architecture. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	multiple	single	multiple	single	multiple	single	multiple	single	multiple	single
multiple	0	1	0	64	0	100	0	0	0	97
single	0	0	17	0	0	0	0	0	3	0

Table 15: Differences in Sigma values for PC2 analysis of Architecture. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

PC3 - Parameters

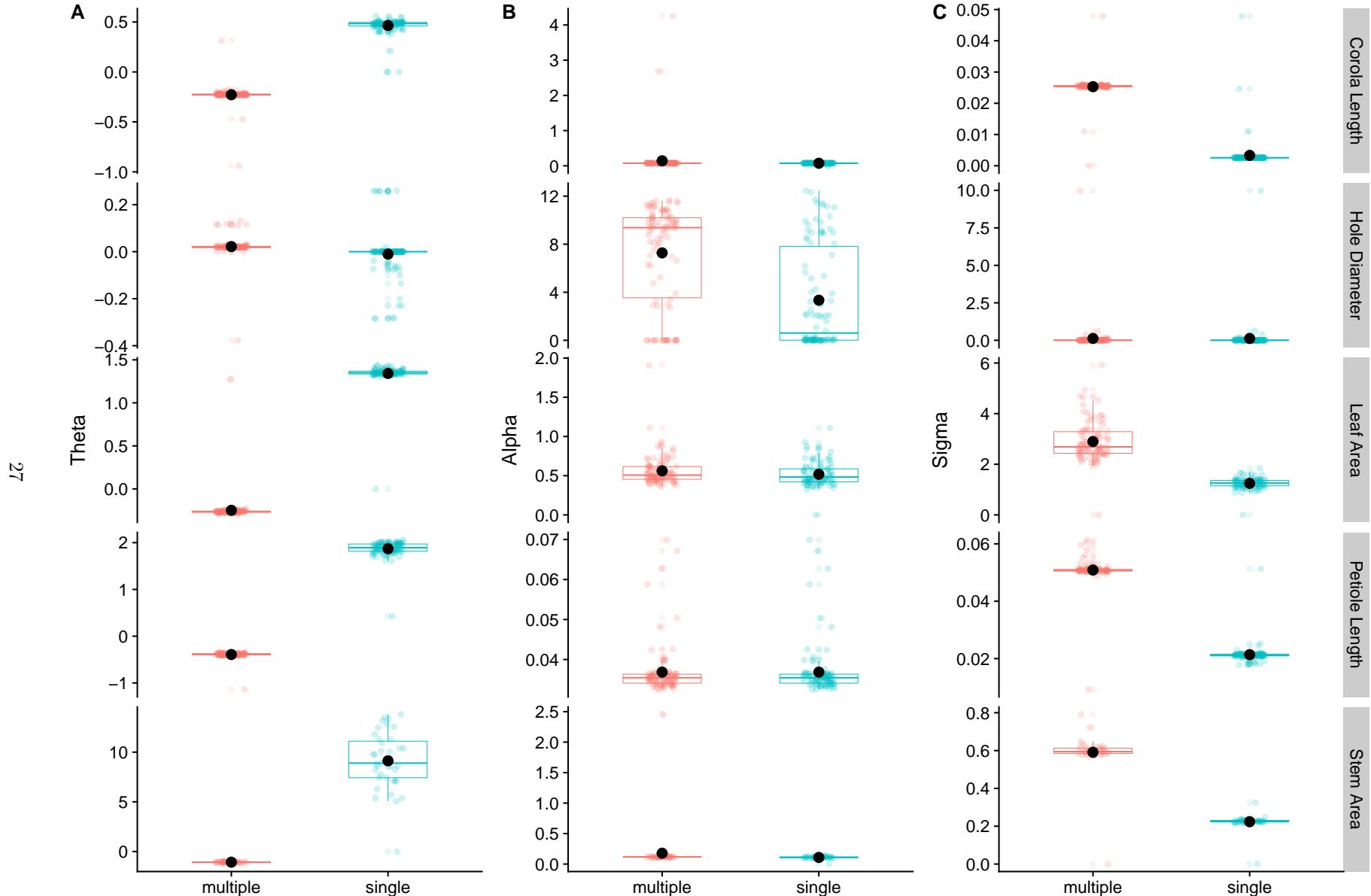


Figure 6: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Architecture.

PC3 - Parameter differences

Table 16: Differences in Theta values for PC3 analysis of Architecture. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	multiple	single	multiple	single	multiple	single	multiple	single	multiple	single
multiple	0	1	0	90	0	1	0	0	0	0
single	99	0	8	0	98	0	100	0	39	0

Table 17: Differences in Alpha values for PC3 analysis of Architecture. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

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	Corolla Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	multiple	single	multiple	single	multiple	single	multiple	single	multiple	single
multiple	0	2	0	67	0	99	0	0	0	39
single	0	0	21	0	0	0	0	0	0	0

Table 18: Differences in Sigma values for PC3 analysis of Architecture. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	multiple	single	multiple	single	multiple	single	multiple	single	multiple	single
multiple	0	97	0	10	0	98	0	99	0	38
single	1	0	0	0	0	0	1	0	0	0

Domatium Growth

PC1 - Parameters

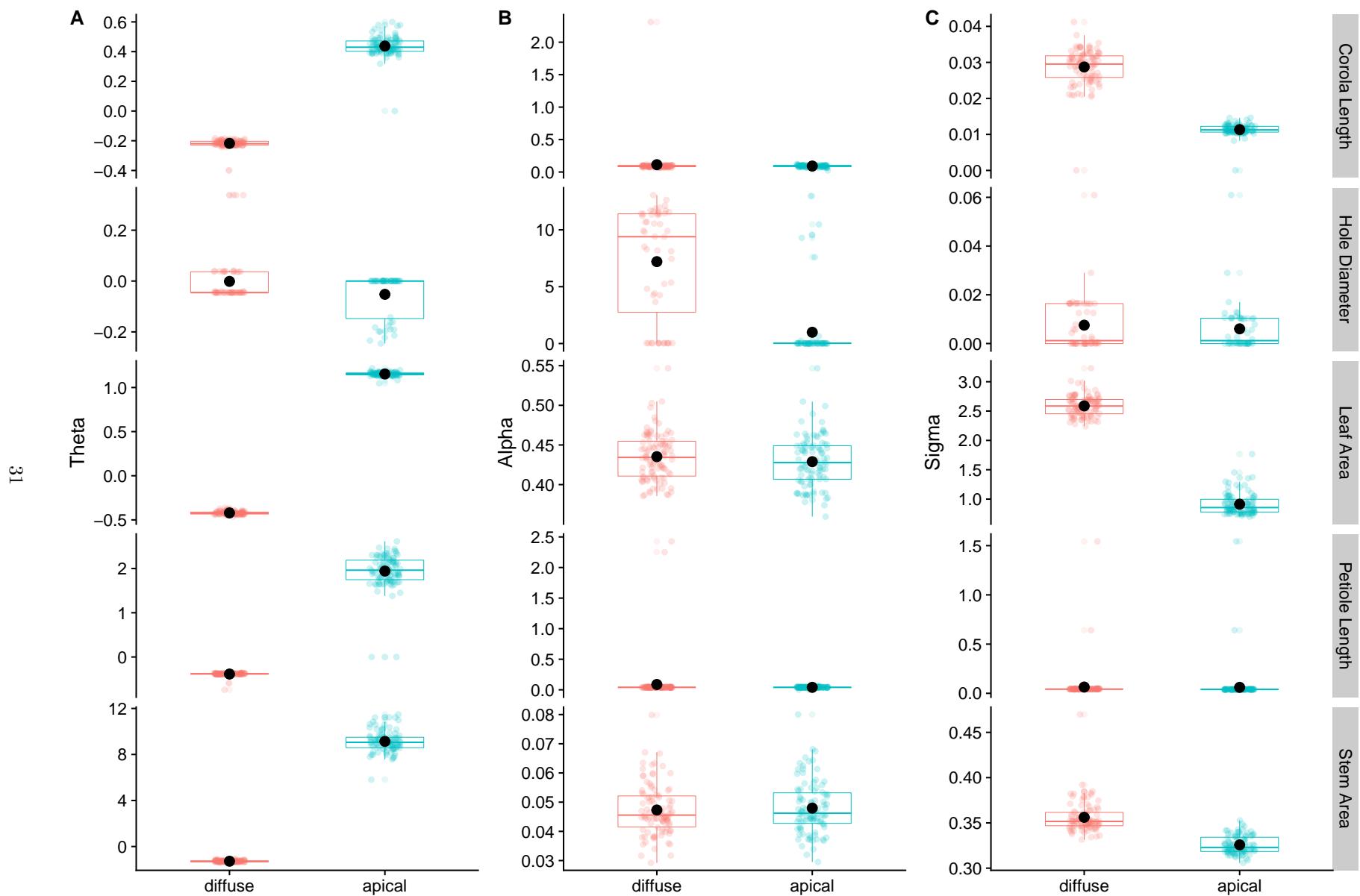


Figure 7: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Domatium Growth.

PC1 - Parameter differences

Table 19: Differences in Theta values for PC1 analysis of Domatium Growth. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical
diffuse	0	0	0	17	0	0	0	0	0	0
apical	100	0	35	0	100	0	100	0	98	0

Table 20: Differences in Alpha values for PC1 analysis of Domatium Growth. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical
diffuse	0	1	0	37	0	100	0	2	0	20
apical	75	0	2	0	0	0	1	0	78	0

Table 21: Differences in Sigma values for PC1 analysis of Domatium Growth. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

PC2 - Parameters

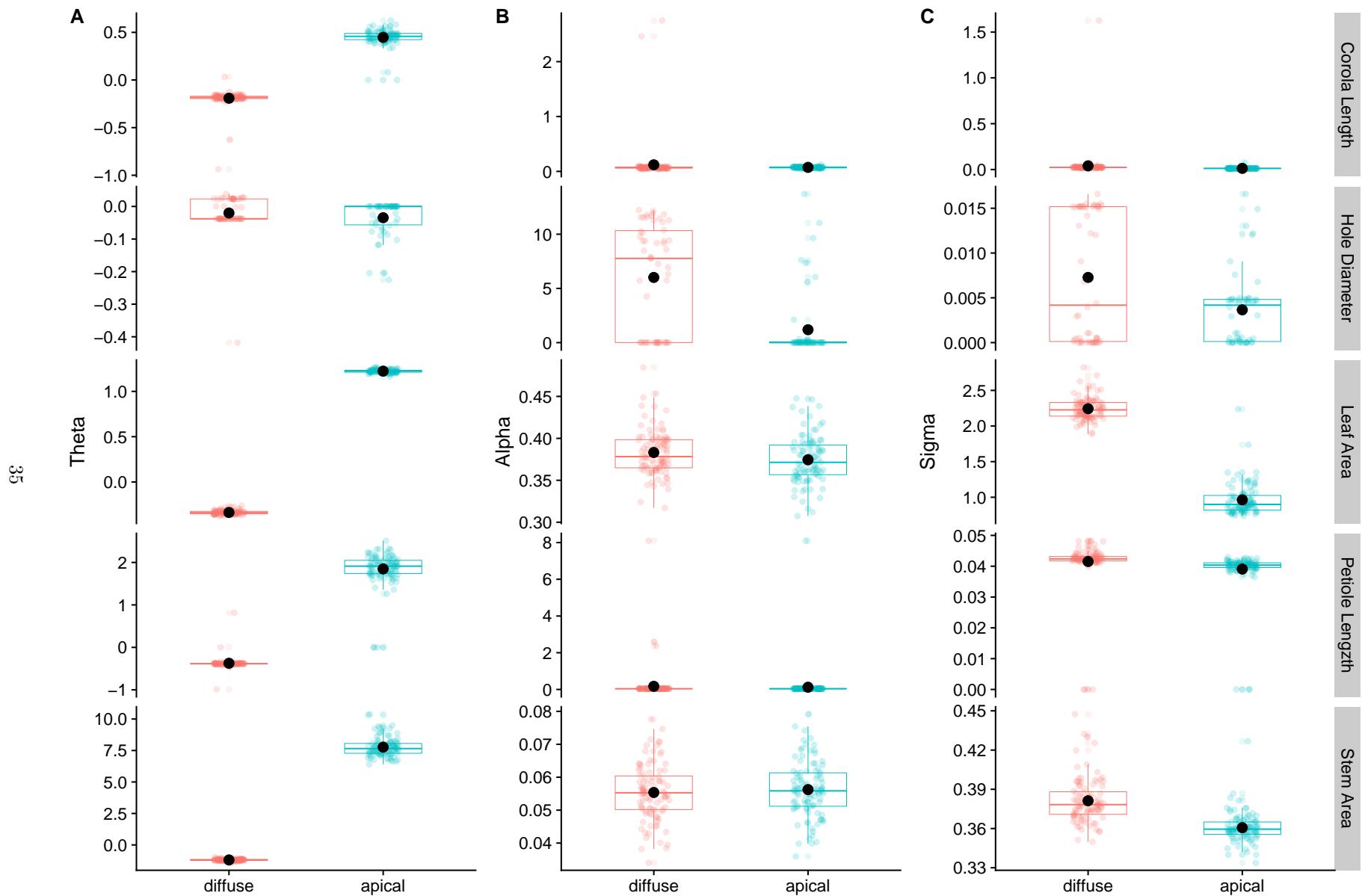


Figure 8: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Domatium Growth.

PC2 - Parameter differences

Table 22: Differences in Theta values for PC2 analysis of Domatium Growth. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical
diffuse	0	1	0	22	0	0	0	2	0	0
apical	99	0	32	0	99	0	98	0	99	0

Table 23: Differences in Alpha values for PC2 analysis of Domatium Growth. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical
diffuse	0	2	0	32	0	99	0	2	0	17
apical	75	0	3	0	0	0	3	0	82	0

Table 24: Differences in Sigma values for PC2 analysis of Domatium Growth. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

PC3 - Parameters

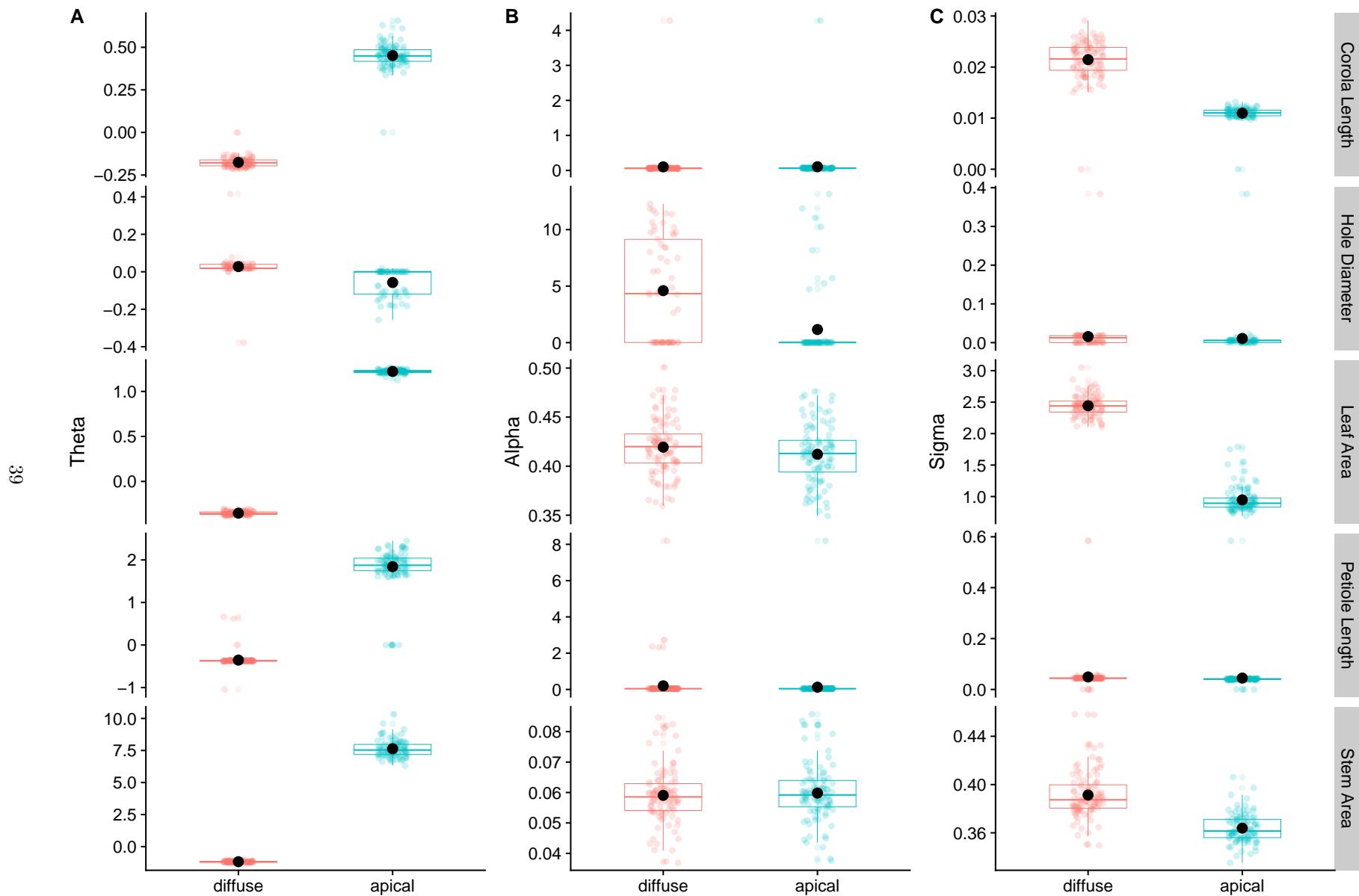


Figure 9: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Domatium Growth.

PC3 - Parameter differences

Table 25: Differences in Theta values for PC3 analysis of Domatium Growth. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical
diffuse	0	0	0	59	0	0	0	3	0	0
apical	100	0	2	0	99	0	97	0	99	0

Table 26: Differences in Alpha values for PC3 analysis of Domatium Growth. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical
diffuse	0	0	0	33	0	99	0	3	0	28
apical	91	0	3	0	0	0	0	0	71	0

Table 27: Differences in Sigma values for PC3 analysis of Domatium Growth. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical
diffuse	0	100	0	25	0	99	0	97	0	98
apical	0	0	0	0	0	0	0	0	1	0

Leaf Structure

PC1 - Parameters

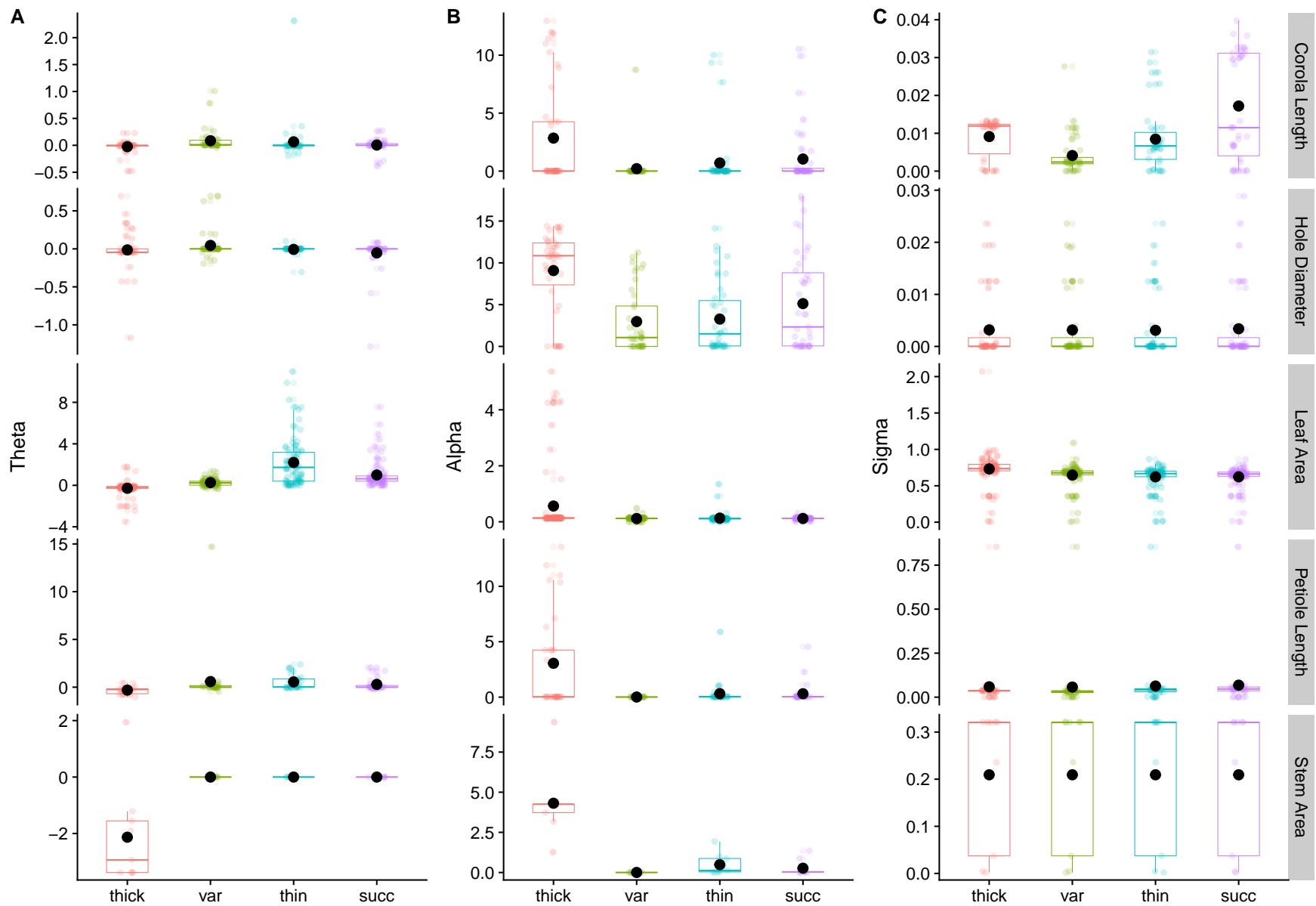


Figure 10: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Leaf Structure.

PC1 - Parameter differences

Table 28: Differences in Theta values for PC1 analysis of Leaf Structure. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length				Hole Diameter				Leaf Area				Petiole Length				Stem Area			
	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ
thick	0	10	21	15	0	10	11	14	0	12	3	3	0	6	4	5	0	1	1	1
var	32	0	22	19	33	0	18	26	80	0	11	12	24	0	5	9	8	0	0	0
thin	21	8	0	12	32	9	0	22	89	72	0	62	26	13	0	12	8	1	0	0
succ	27	11	18	0	29	8	12	0	89	71	21	0	25	9	6	0	8	1	1	0

Table 29: Differences in Alpha values for PC1 analysis of Leaf Structure. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length				Hole Diameter				Leaf Area				Petiole Length				Stem Area			
	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ
thick	0	15	14	13	0	32	33	27	0	90	92	90	0	21	17	14	0	9	9	9
var	3	0	4	2	10	0	19	16	2	0	60	24	2	0	2	0	0	0	0	0
thin	4	14	0	5	9	23	0	13	0	32	0	25	6	21	0	11	0	9	0	5
succ	5	16	13	0	15	26	29	0	2	68	67	0	9	23	11	0	0	9	3	0

Table 30: Differences in Sigma values for PC1 analysis of Leaf Structure. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length				Hole Diameter				Leaf Area				Petiole Length				Stem Area			
	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ
thick	0	25	21	8	0	1	1	0	0	79	73	79	0	13	3	0	0	0	0	0
var	2	0	2	4	0	0	1	0	2	0	51	70	5	0	3	3	0	0	0	0
thin	6	25	0	6	0	0	0	0	8	30	0	54	15	15	0	3	0	0	0	0
succ	19	23	21	0	1	1	1	0	2	11	27	0	18	15	15	0	0	0	0	0

PC2 - Parameters

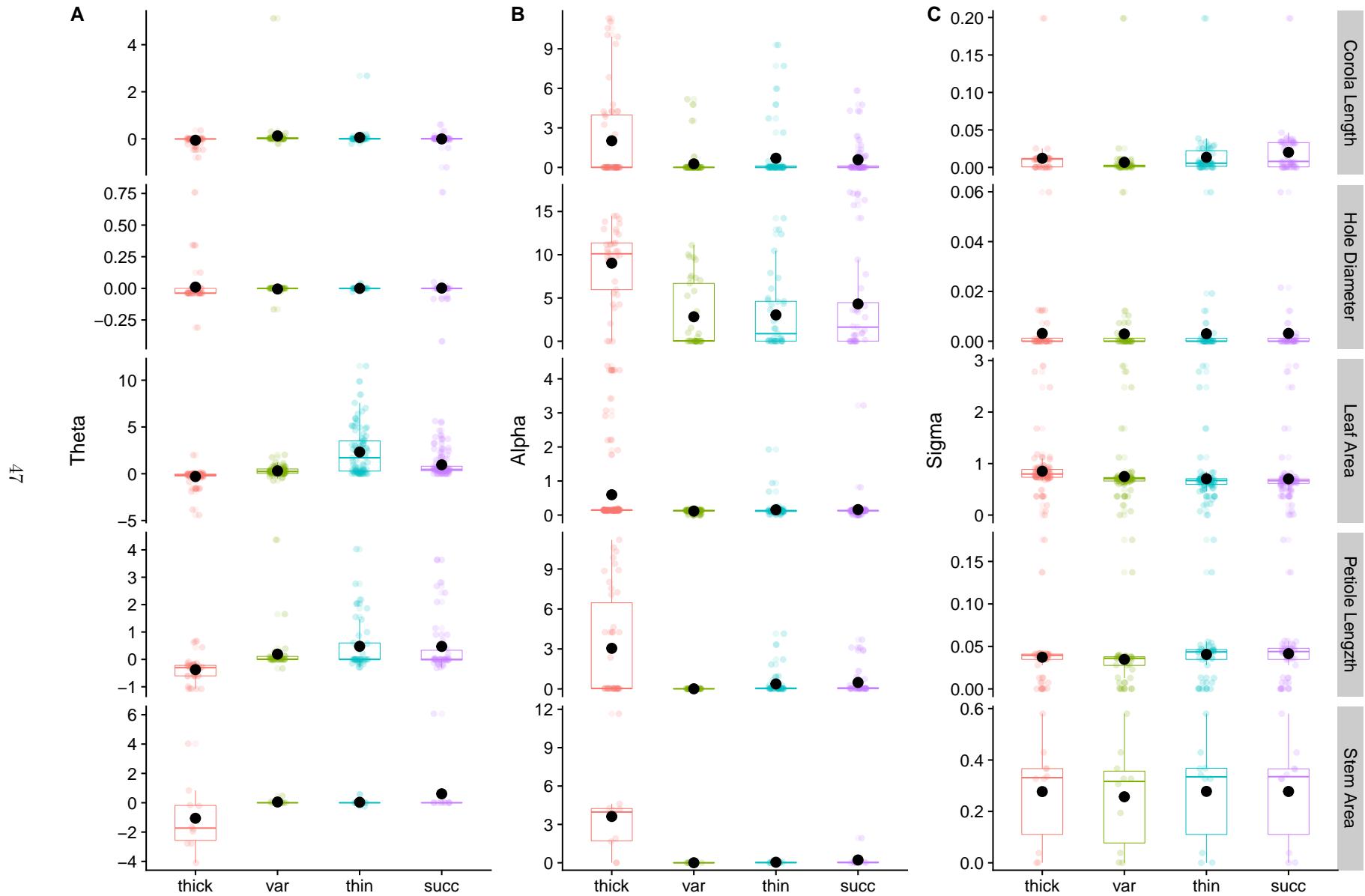


Figure 11: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Leaf Structure.

PC2 - Parameter differences

Table 31: Differences in Theta values for PC2 analysis of Leaf Structure. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length				Hole Diameter				Leaf Area				Petiole Length				Stem Area			
	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ
thick	0	11	17	17	0	9	8	10	0	9	3	3	0	4	4	7	0	2	3	2
var	43	0	34	23	28	0	14	9	82	0	13	23	38	0	11	13	8	0	1	1
thin	37	7	0	17	29	9	0	10	88	68	0	56	38	14	0	13	7	1	0	1
succ	37	18	24	0	27	11	14	0	88	58	25	0	35	12	12	0	8	1	1	0

Table 32: Differences in Alpha values for PC2 analysis of Leaf Structure. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length				Hole Diameter				Leaf Area				Petiole Length				Stem Area			
	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ
thick	0	16	17	15	0	33	31	27	0	91	91	91	0	36	27	24	0	10	9	10
var	2	0	2	6	2	0	11	13	0	0	64	45	0	0	1	2	0	0	0	0
thin	1	16	0	7	4	24	0	15	0	27	0	30	9	35	0	15	1	10	0	4
succ	3	12	11	0	8	22	20	0	0	46	61	0	12	34	20	0	0	10	6	0

Table 33: Differences in Sigma values for PC2 analysis of Leaf Structure. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length				Hole Diameter				Leaf Area				Petiole Length				Stem Area			
	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ
thick	0	33	23	13	0	2	1	1	0	78	77	77	0	24	0	0	0	2	0	1
var	4	0	2	2	0	0	1	1	0	0	65	71	0	0	0	0	0	0	0	0
thin	14	35	0	15	1	1	0	1	1	13	0	41	24	24	0	10	2	2	0	1
succ	24	35	22	0	1	1	1	0	1	7	37	0	24	24	14	0	1	2	1	0

PC3 - Parameters

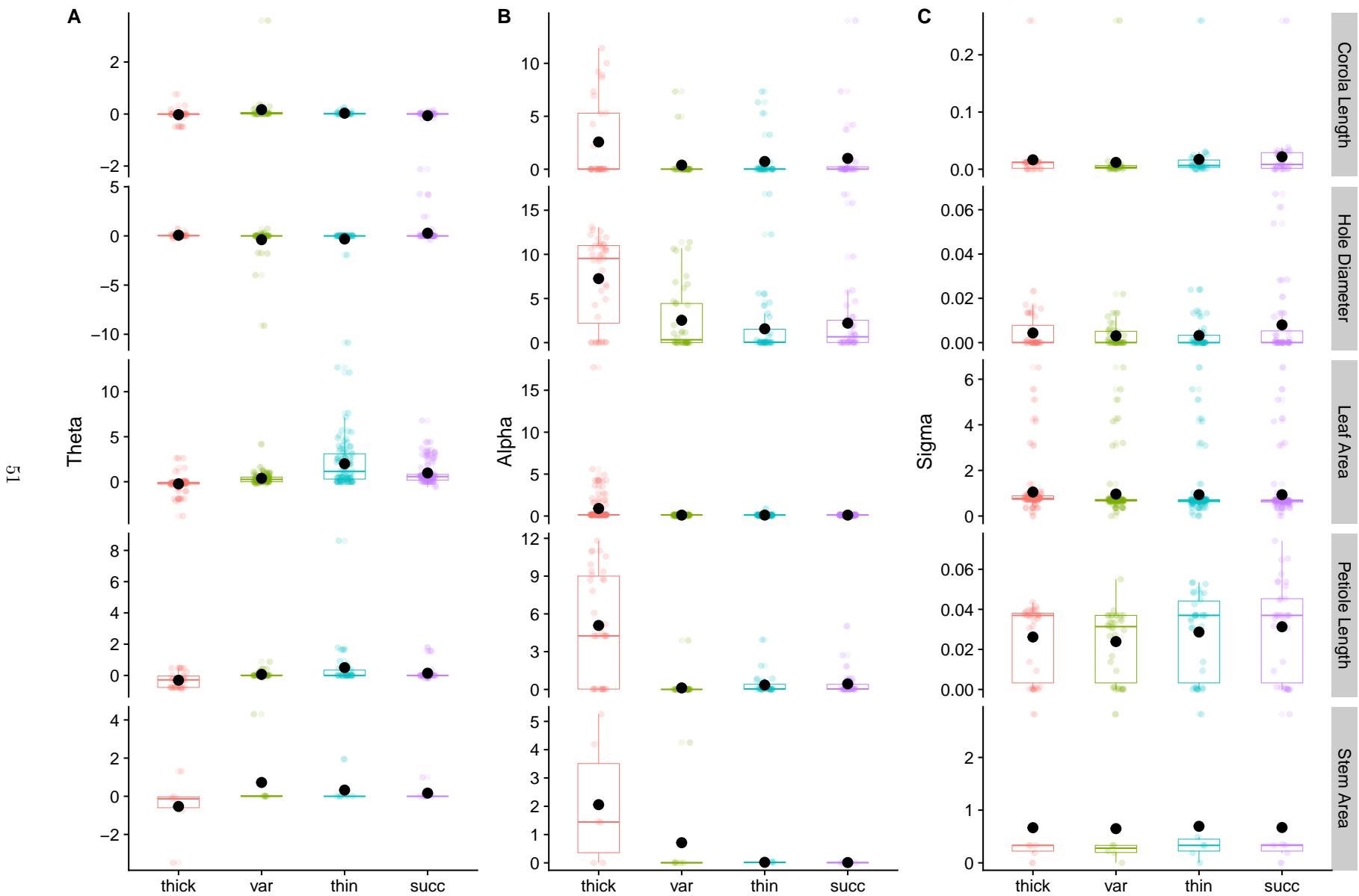


Figure 12: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Leaf Structure.

PC3 - Parameter differences

Table 34: Differences in Theta values for PC3 analysis of Leaf Structure. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length				Hole Diameter				Leaf Area				Petiole Length				Stem Area			
	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ
thick	0	6	9	11	0	34	32	30	0	15	7	9	0	7	7	8	0	1	2	2
var	26	0	19	19	6	0	13	10	77	0	11	19	27	0	1	6	5	0	3	3
thin	23	3	0	13	8	13	0	10	85	70	0	55	27	10	0	8	4	1	0	3
succ	21	3	9	0	10	15	16	0	83	62	25	0	26	5	3	0	4	1	1	0

Table 35: Differences in Alpha values for PC3 analysis of Leaf Structure. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

eg	Corolla Length				Hole Diameter				Leaf Area				Petiole Length				Stem Area			
	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ
thick	0	11	10	9	0	26	30	27	0	91	91	92	0	29	27	24	0	5	5	4
var	0	0	1	2	6	0	17	14	1	0	58	34	0	0	1	1	1	0	1	1
thin	1	10	0	3	2	15	0	10	1	34	0	34	2	28	0	13	1	5	0	5
succ	2	9	8	0	5	18	22	0	0	58	57	0	5	27	16	0	2	5	1	0

Table 36: Differences in Sigma values for PC3 analysis of Leaf Structure. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length				Hole Diameter				Leaf Area				Petiole Length				Stem Area			
	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ
thick	0	20	12	8	0	7	5	2	0	73	71	74	0	10	1	0	0	1	0	0
var	1	0	1	0	1	0	5	2	1	0	50	69	1	0	1	1	0	0	0	0
thin	9	20	0	9	3	3	0	1	3	24	0	47	10	10	0	2	1	1	0	1
succ	13	21	12	0	6	6	7	0	0	5	27	0	11	10	9	0	1	1	0	0

Mating System

PC1 - Parameters

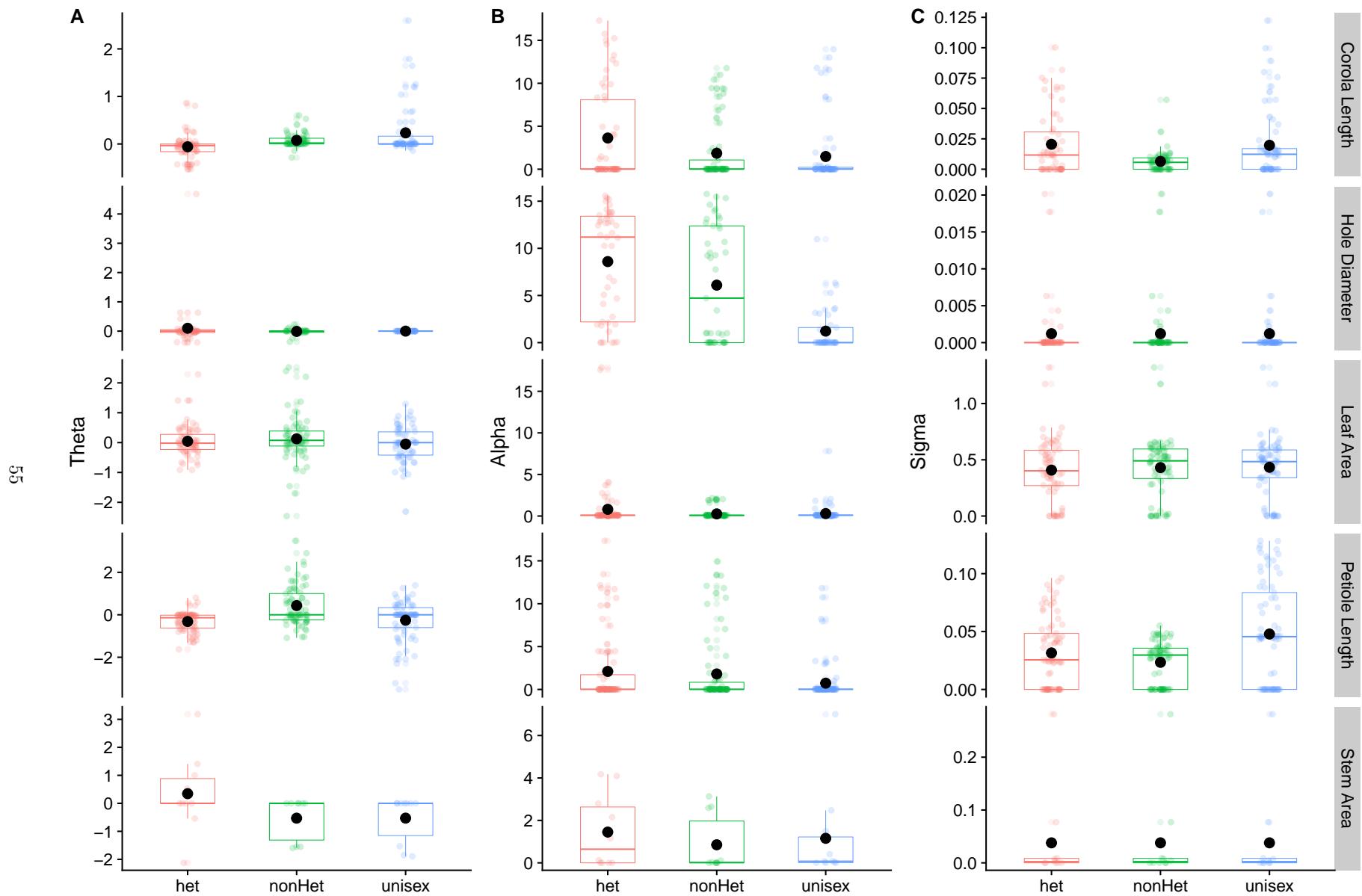


Figure 13: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Mating System.

PC1 - Parameter differences

Table 37: Differences in Theta values for PC1 analysis of Mating System. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex
het	0	17	18	0	22	16	0	26	41	0	30	37	0	8	6
nonHet	44	0	32	23	0	12	46	0	40	47	0	58	2	0	5
unisex	43	24	0	29	27	0	31	30	0	40	15	0	4	4	0

Table 38: Differences in Alpha values for PC1 analysis of Mating System. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex
het	0	22	23	0	28	40	0	42	25	0	13	21	0	6	4
nonHet	15	0	20	17	0	33	30	0	23	19	0	22	4	0	4
unisex	14	17	0	5	12	0	47	49	0	11	10	0	6	6	0

Table 39: Differences in Sigma values for PC1 analysis of Mating System. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex
het	0	30	18	0	0	0	0	20	30	0	34	21	0	0	0
nonHet	4	0	1	0	0	0	35	0	32	15	0	0	0	0	0
unisex	16	33	0	0	0	0	25	23	0	28	49	0	0	0	0

PC2 - Parameters

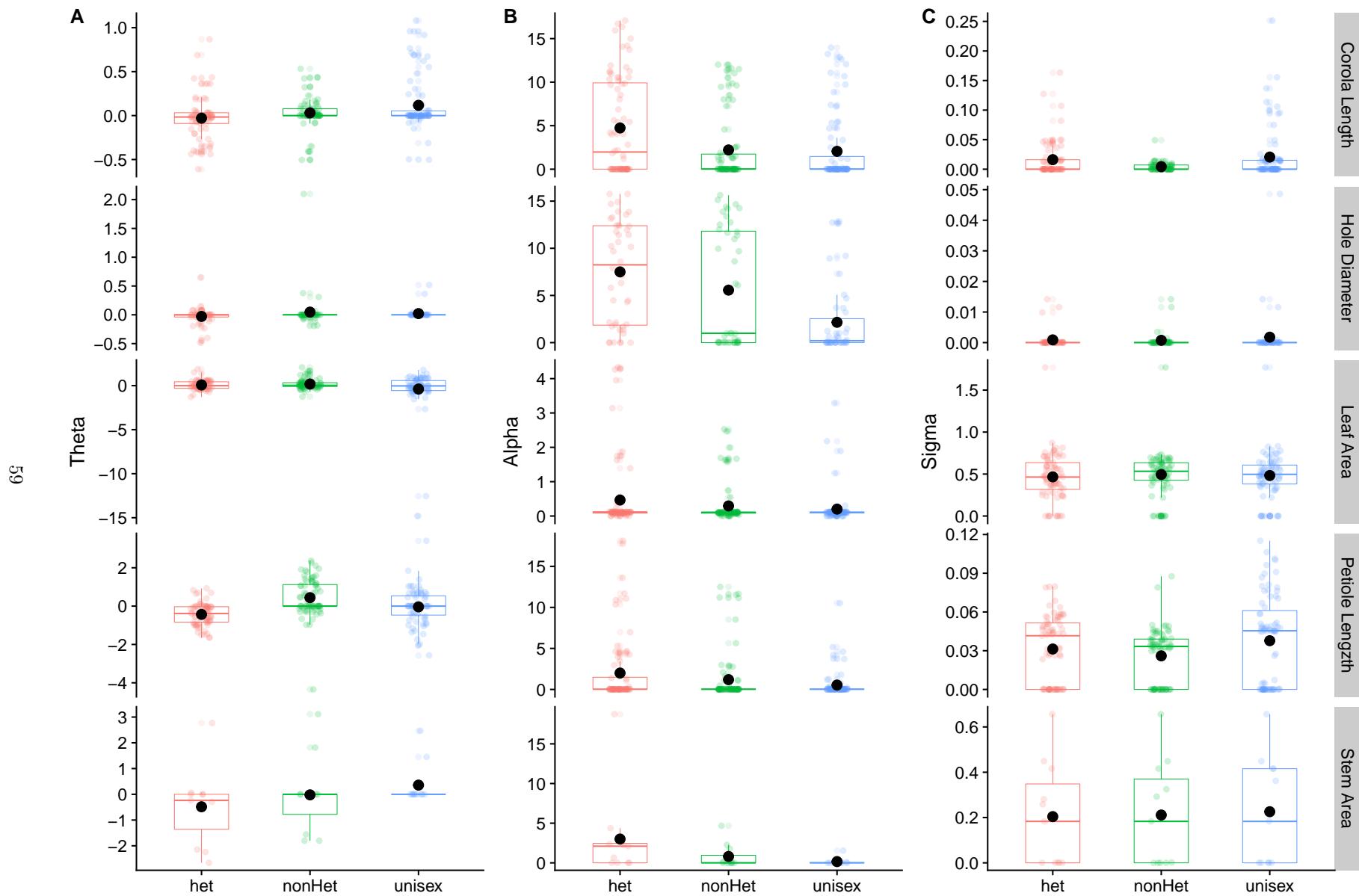


Figure 14: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Mating System.

PC2 - Parameter differences

Table 40: Differences in Theta values for PC2 analysis of Mating System. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex
het	0	27	27	0	22	12	0	29	45	0	27	39	0	5	3
nonHet	49	0	31	22	0	10	47	0	44	48	0	53	6	0	3
unisex	49	32	0	32	29	0	31	28	0	36	16	0	8	6	0

Table 41: Differences in Alpha values for PC2 analysis of Mating System. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex
het	0	34	35	0	28	35	0	45	36	0	20	23	0	6	8
nonHet	17	0	29	15	0	28	31	0	26	9	0	16	5	0	4
unisex	16	22	0	8	15	0	40	50	0	6	13	0	3	7	0

Table 42: Differences in Sigma values for PC2 analysis of Mating System. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex
het	0	30	18	0	1	0	0	24	34	0	36	24	0	0	0
nonHet	3	0	0	0	0	0	34	0	36	12	0	6	2	0	0
unisex	15	33	0	1	1	0	24	22	0	24	42	0	2	2	0

PC3 - Parameters

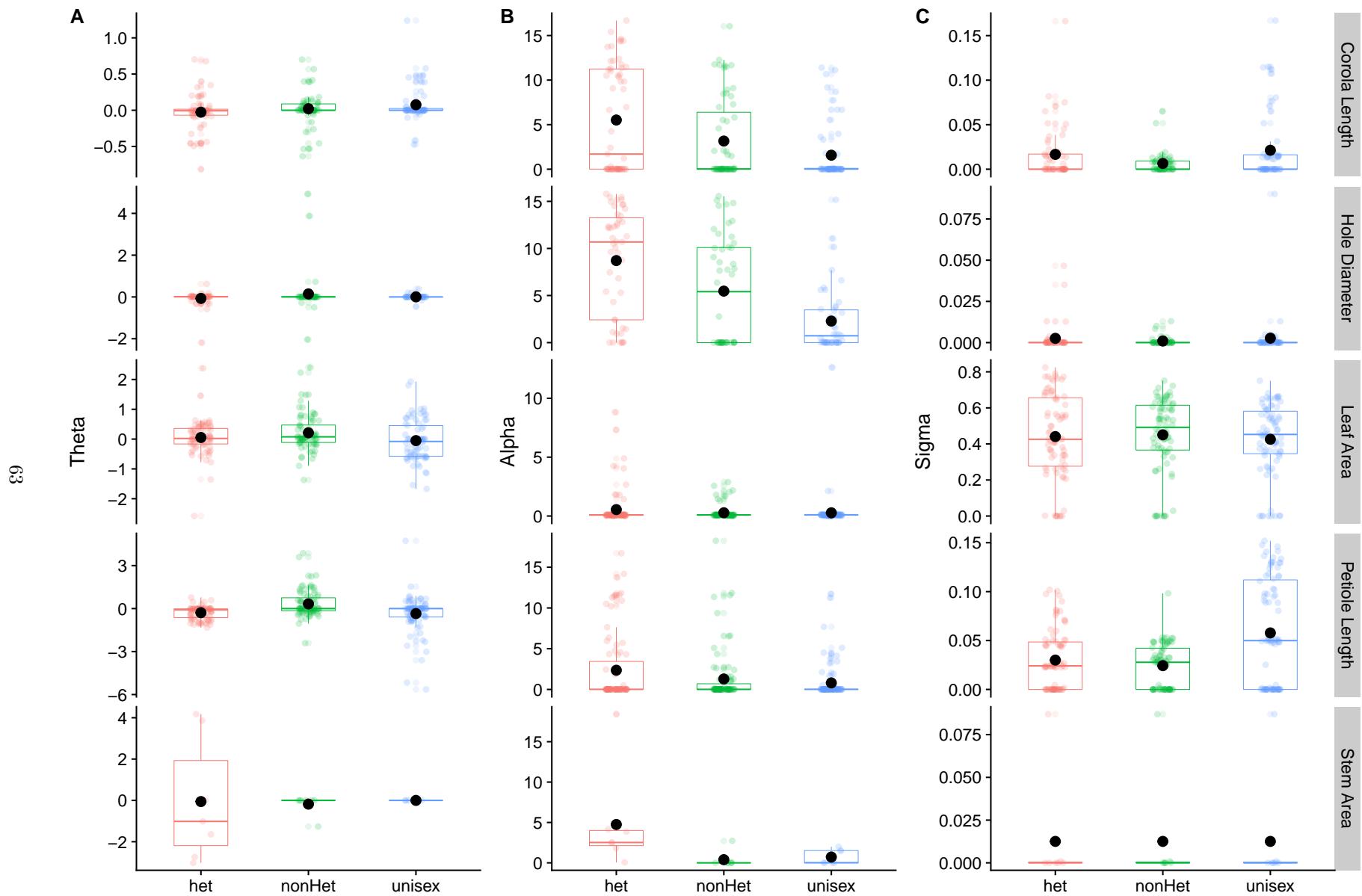


Figure 15: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Mating System.

PC3 - Parameter differences

Table 43: Differences in Theta values for PC3 analysis of Mating System. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex
het	0	22	23	0	27	29	0	34	51	0	35	44	0	3	2
nonHet	37	0	26	20	0	28	44	0	50	48	0	62	4	0	5
unisex	36	30	0	18	15	0	27	25	0	39	16	0	5	1	0

Table 44: Differences in Alpha values for PC3 analysis of Mating System. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex
het	0	24	31	0	34	39	0	46	30	0	20	28	0	6	7
nonHet	14	0	23	10	0	23	32	0	26	17	0	22	1	0	3
unisex	7	15	0	5	21	0	48	52	0	9	15	0	0	4	0

Table 45: Differences in Sigma values for PC3 analysis of Mating System. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex
het	0	22	13	0	3	2	0	25	38	0	30	18	0	0	0
nonHet	3	0	1	0	0	2	38	0	42	22	0	2	0	0	0
unisex	12	24	0	1	1	0	25	21	0	34	50	0	0	0	0

Reward

PC1 - Parameters

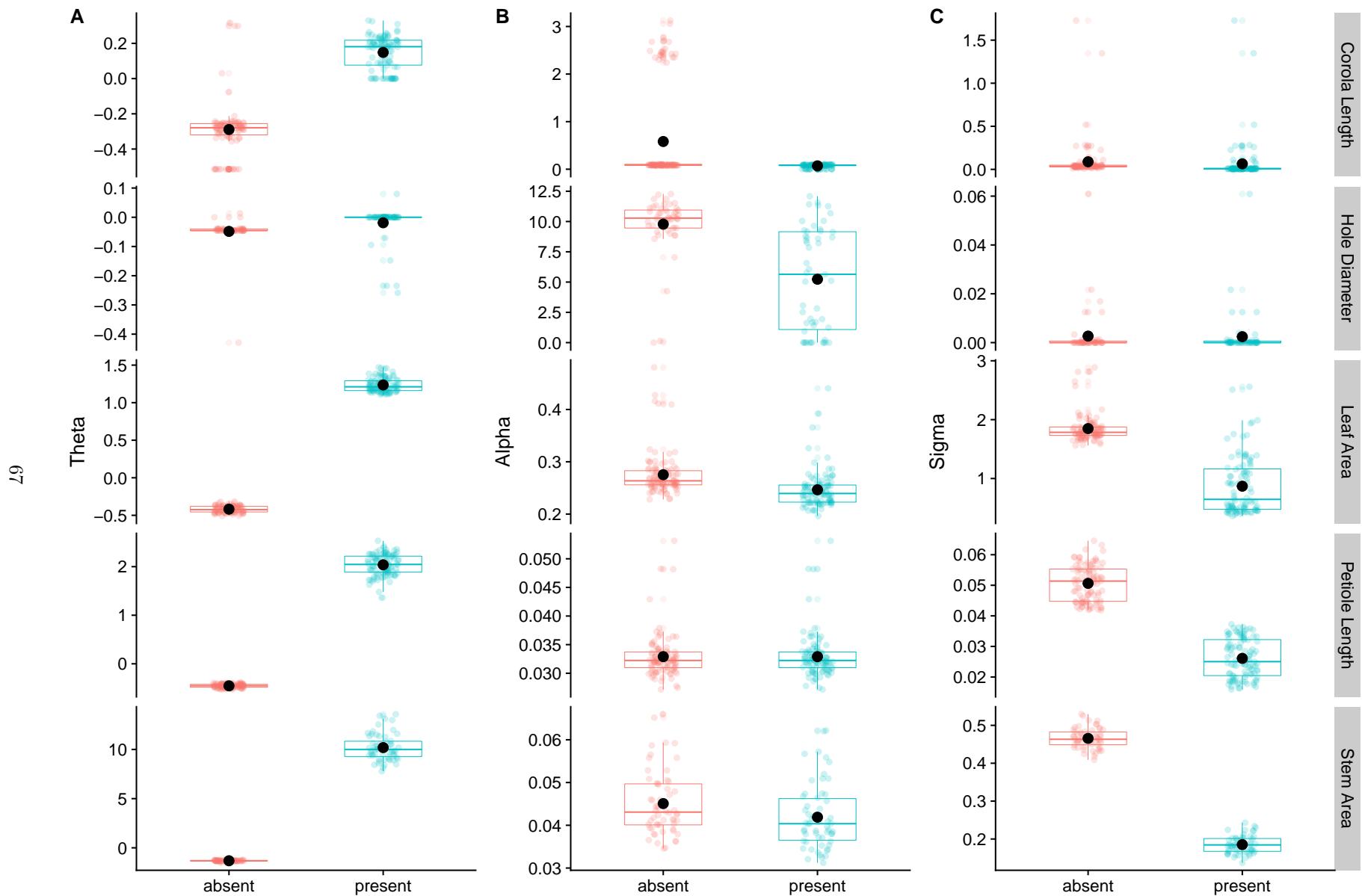


Figure 16: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Reward.

PC1 - Parameter differences

Table 46: Differences in Theta values for PC1 analysis of Reward. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	absent	present	absent	present	absent	present	absent	present	absent	present
absent	0	4	0	6	0	0	0	0	0	0
present	90	0	45	0	100	0	100	0	58	0

Table 47: Differences in Alpha values for PC1 analysis of Reward. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

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	Corolla Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	absent	present	absent	present	absent	present	absent	present	absent	present
absent	0	19	0	41	0	100	0	0	0	58
present	0	0	9	0	0	0	0	0	0	0

Table 48: Differences in Sigma values for PC1 analysis of Reward. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

PC2 - Parameter

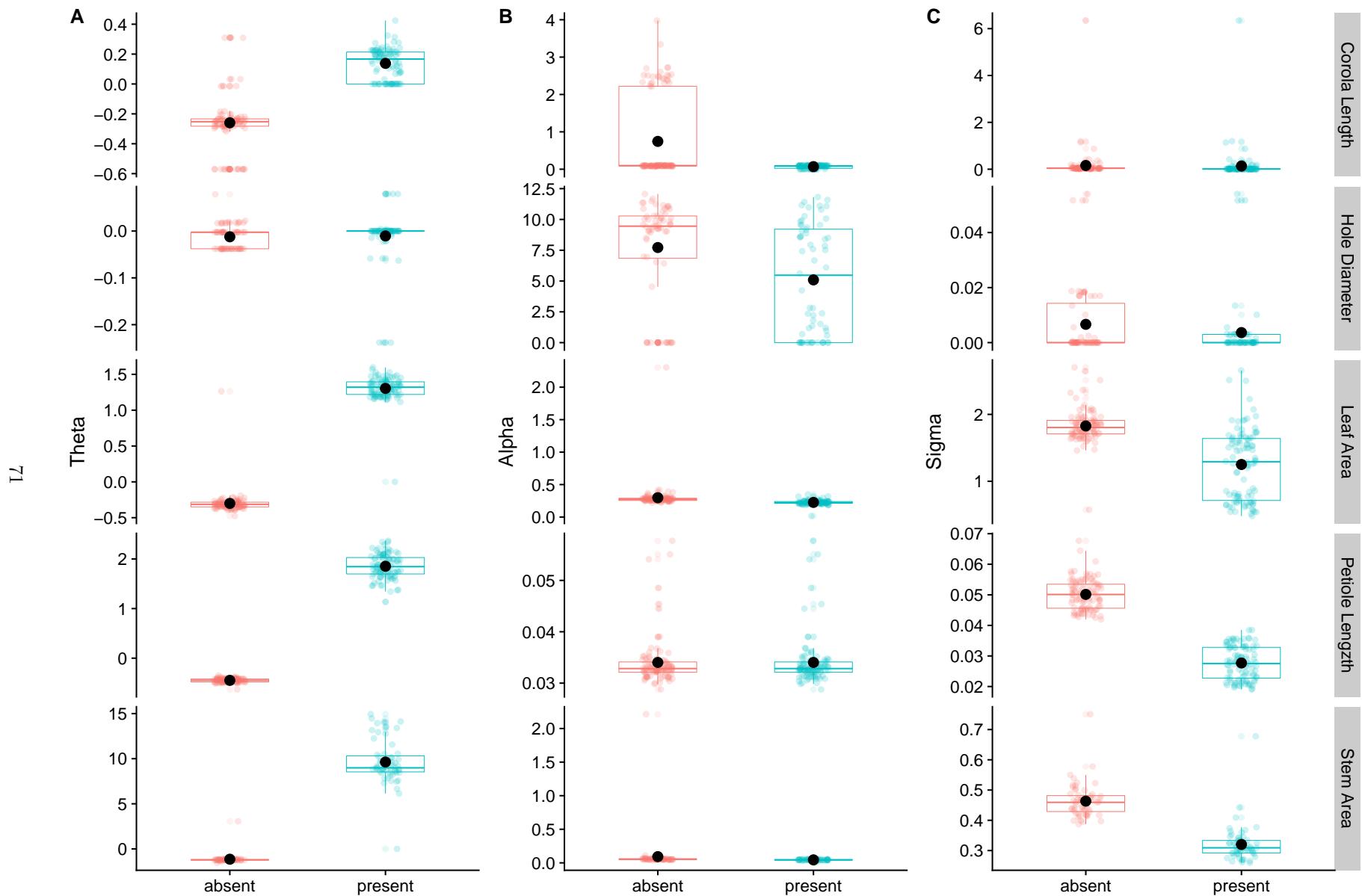


Figure 17: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Reward.

PC2 - Parameter differences

Table 49: Differences in Theta values for PC2 analysis of Reward. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	absent	present	absent	present	absent	present	absent	present	absent	present
absent	0	6	0	18	0	1	0	0	0	1
present	88	0	46	0	99	0	100	0	58	0

Table 50: Differences in Alpha values for PC2 analysis of Reward. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	absent	present	absent	present	absent	present	absent	present	absent	present
absent	0	25	0	37	0	100	0	0	0	59
present	5	0	14	0	0	0	0	0	0	0

Table 51: Differences in Sigma values for PC2 analysis of Reward. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

PC3 - Parameters

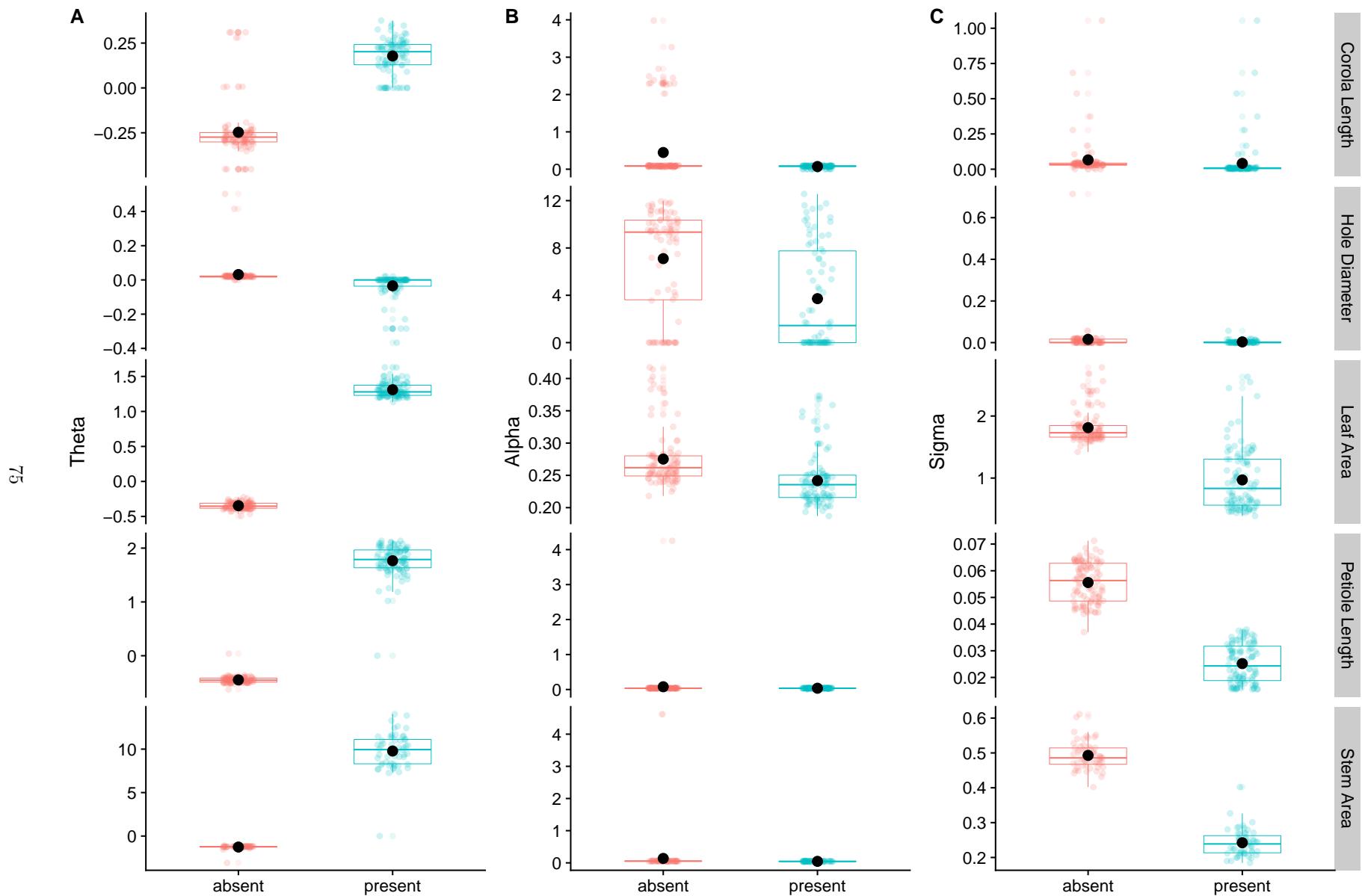


Figure 18: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Reward.

PC3 - Parameter differences

Table 52: Differences in Theta values for PC3 analysis of Reward. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	absent	present	absent	present	absent	present	absent	present	absent	present
absent	0	8	0	79	0	0	0	1	0	0
present	86	0	1	0	100	0	99	0	55	0

Table 53: Differences in Alpha values for PC3 analysis of Reward. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	absent	present	absent	present	absent	present	absent	present	absent	present
absent	0	14	0	50	0	100	0	1	0	55
present	10	0	12	0	0	0	0	0	0	0

Table 54: Differences in Sigma values for PC3 analysis of Reward. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

Strategy

PC1 - Parameters

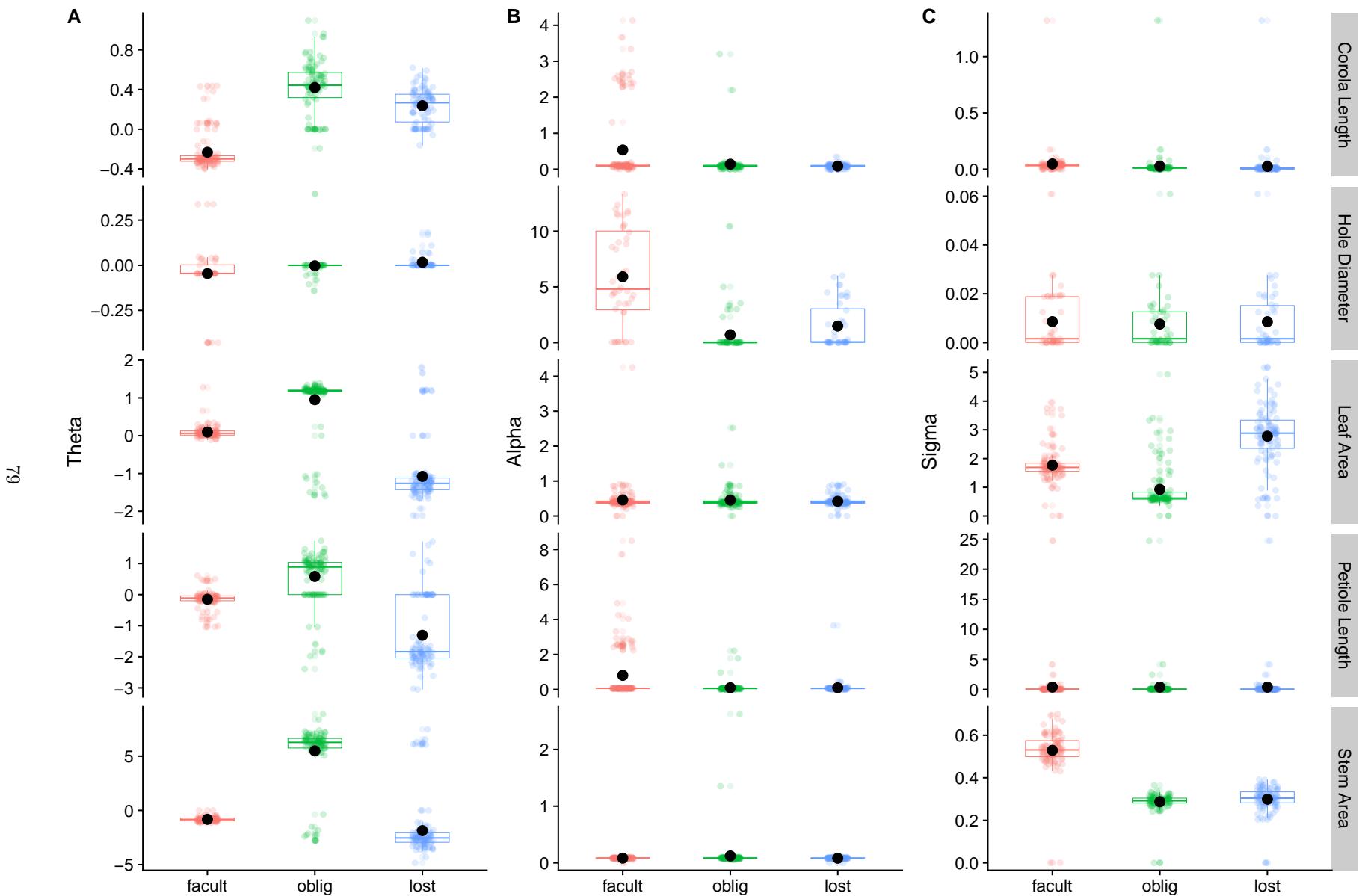


Figure 19: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Strategy.

PC1 - Parameter differences

Table 55: Differences in Theta values for PC1 analysis of Strategy. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost
faculty	0	14	15	0	12	5	0	10	91	0	14	76	0	10	89
oblig	83	0	72	32	0	6	90	0	90	83	0	71	89	0	89
lost	82	11	0	39	29	0	9	9	0	21	12	0	10	10	0

Table 56: Differences in Alpha values for PC1 analysis of Strategy. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost
faculty	0	16	18	0	33	35	0	90	11	0	22	23	0	91	79
oblig	39	0	28	3	0	8	10	0	10	2	0	12	8	0	61
lost	37	27	0	1	28	0	89	90	0	1	12	0	20	38	0

Table 57: Differences in Sigma values for PC1 analysis of Strategy. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost
faculty	0	79	78	0	8	5	0	89	8	0	71	69	0	97	97
oblig	0	0	43	1	0	0	8	0	8	2	0	63	0	0	31
lost	1	36	0	4	9	0	89	89	0	4	10	0	0	66	0

PC2 - Parameters

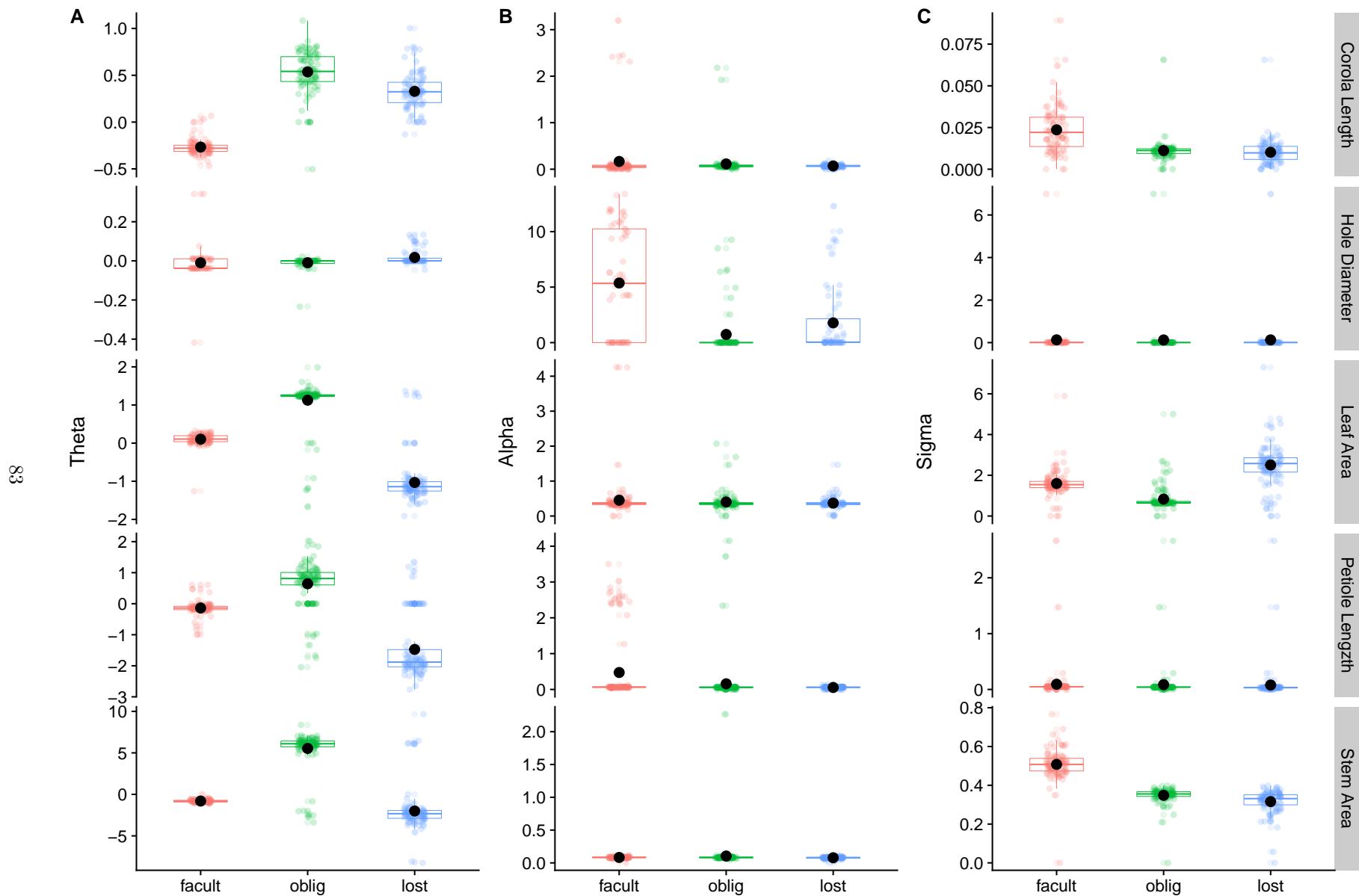


Figure 20: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Strategy.

PC2 - Parameter differences

Table 58: Differences in Theta values for PC2 analysis of Strategy. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost
faculty	0	3	3	0	24	11	0	5	90	0	13	82	0	7	90
oblig	91	0	78	34	0	6	93	0	91	83	0	78	92	0	92
lost	91	12	0	47	39	0	8	5	0	14	8	0	9	7	0

Table 59: Differences in Alpha values for PC2 analysis of Strategy. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost
faculty	0	4	5	0	35	34	0	92	8	0	14	17	0	90	87
oblig	62	0	39	2	0	6	6	0	6	3	0	8	9	0	82
lost	61	27	0	3	31	0	90	92	0	0	9	0	12	17	0

Table 60: Differences in Sigma values for PC2 analysis of Strategy. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost
faculty	0	88	85	0	21	15	0	90	4	0	79	78	0	98	98
oblig	0	0	41	0	0	1	4	0	4	0	0	73	0	0	88
lost	3	47	0	6	20	0	90	90	0	1	6	0	0	10	0

PC3 - Parameters

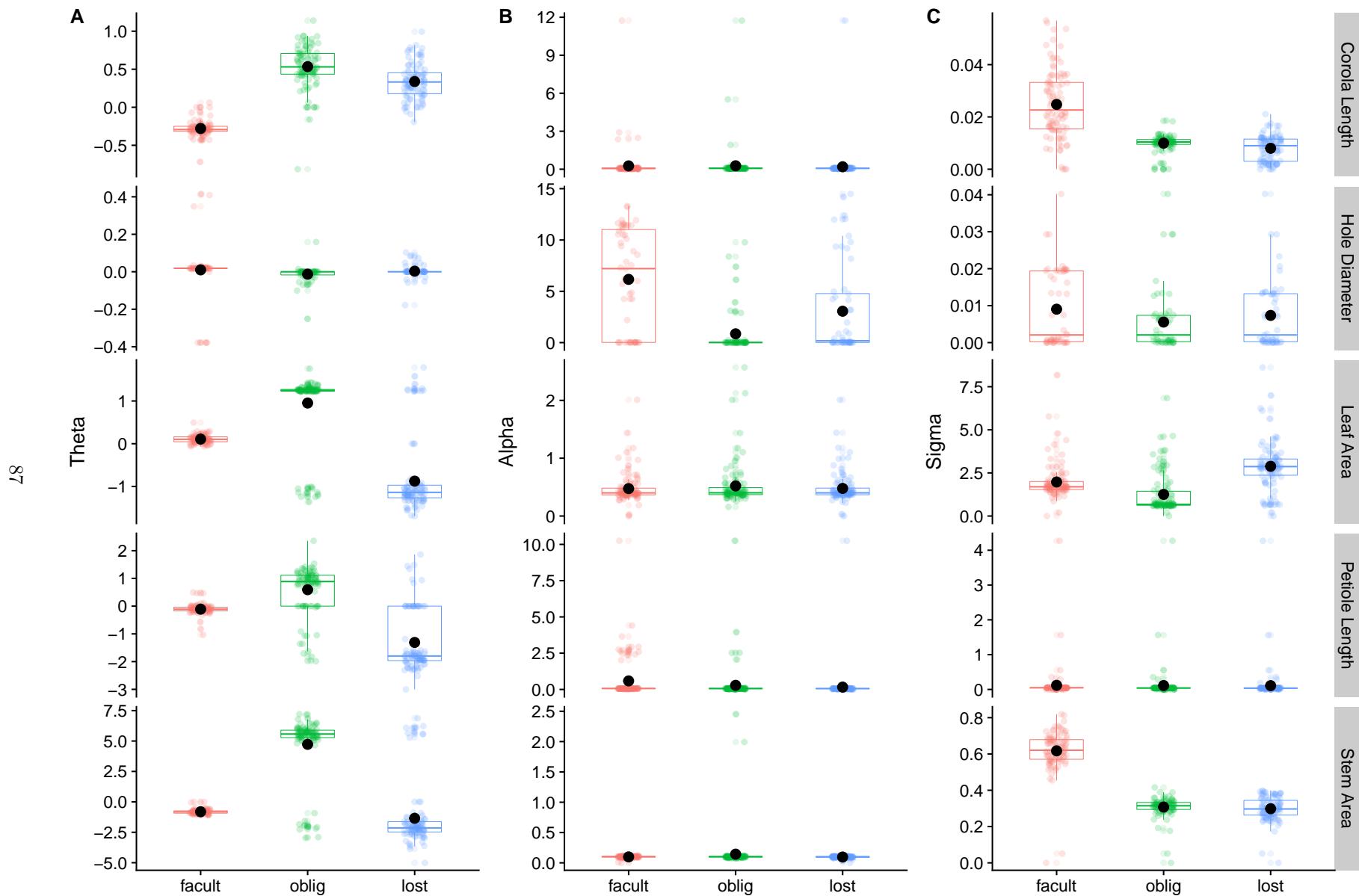


Figure 21: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Strategy.

PC3 - Parameter differences

Table 61: Differences in Theta values for PC3 analysis of Strategy. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost
faculty	0	4	4	0	48	39	0	13	87	0	17	74	0	12	84
oblig	92	0	76	5	0	20	85	0	85	75	0	69	84	0	84
lost	92	17	0	14	20	0	11	13	0	18	12	0	12	12	0

Table 62: Differences in Alpha values for PC3 analysis of Strategy. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost
faculty	0	3	3	0	34	31	0	85	14	0	13	16	0	92	84
oblig	66	0	36	3	0	7	13	0	13	4	0	14	4	0	69
lost	66	33	0	6	30	0	84	85	0	1	3	0	12	27	0

Table 63: Differences in Sigma values for PC3 analysis of Strategy. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost	faculty	oblig	lost
faculty	0	91	86	0	16	13	0	85	11	0	74	74	0	94	94
oblig	0	0	51	0	0	2	11	0	11	1	0	61	0	0	57
lost	5	40	0	3	14	0	85	85	0	1	14	0	0	37	0

Warts

PC1 - Parameters

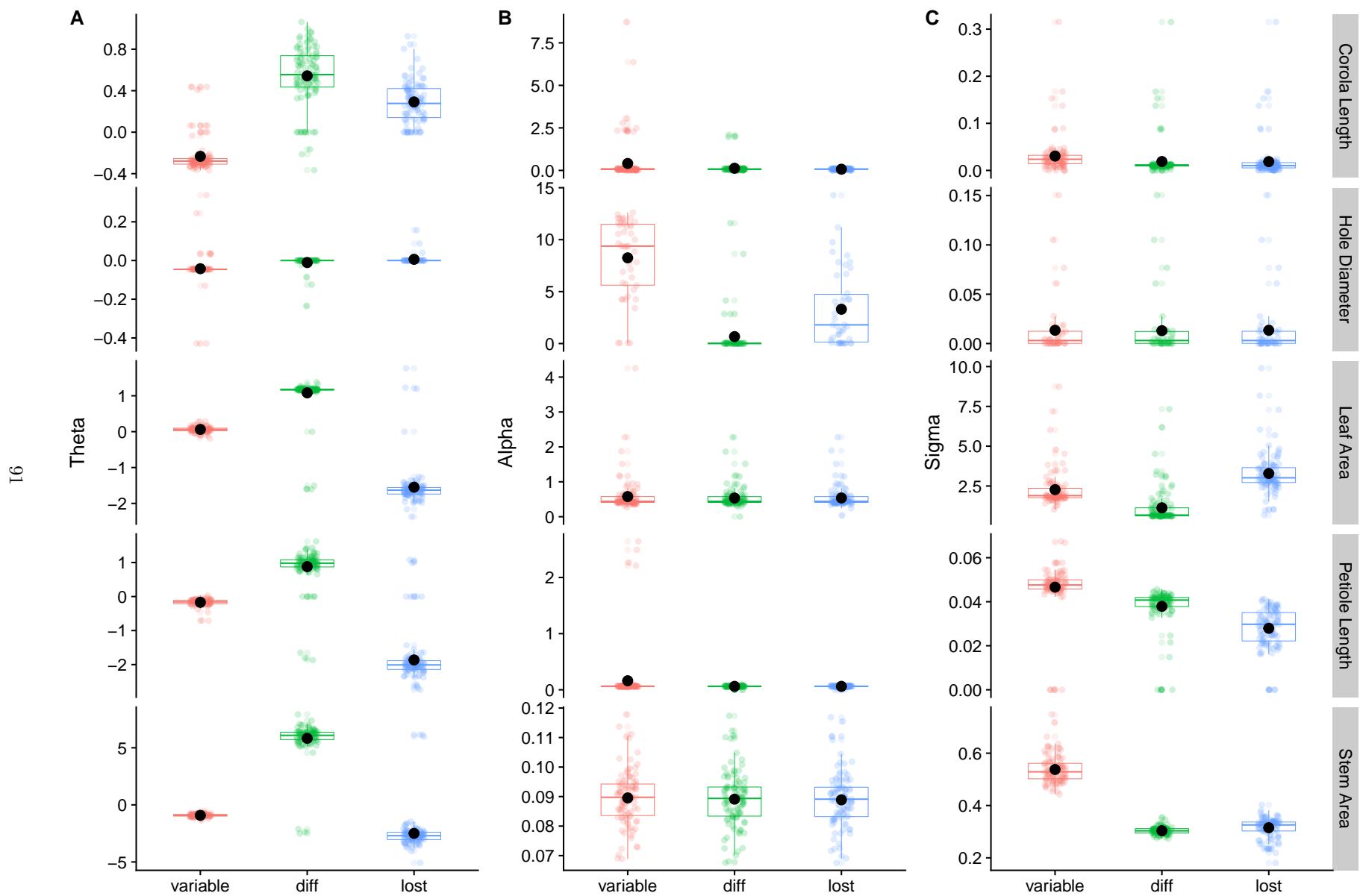


Figure 22: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Warts.

PC1 - Parameter differences

Table 64: Differences in Theta values for PC1 analysis of Warts. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost
variable	0	11	8	0	7	3	0	3	96	0	4	90	0	3	97
diff	89	0	81	39	0	8	97	0	96	92	0	89	97	0	97
lost	92	10	0	43	36	0	4	3	0	6	3	0	3	3	0

Table 65: Differences in Alpha values for PC1 analysis of Warts. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost
variable	0	10	10	0	40	41	0	97	4	0	4	4	0	91	85
diff	56	0	32	2	0	7	3	0	3	0	0	1	9	0	61
lost	55	34	0	1	35	0	96	97	0	0	3	0	15	39	0

Table 66: Differences in Sigma values for PC1 analysis of Warts. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost
variable	0	87	81	0	4	2	0	96	3	0	92	92	0	100	100
diff	0	0	33	0	0	0	3	0	3	0	0	89	0	0	25
lost	6	54	0	2	4	0	96	96	0	0	3	0	0	75	0

PC2 - Parameters

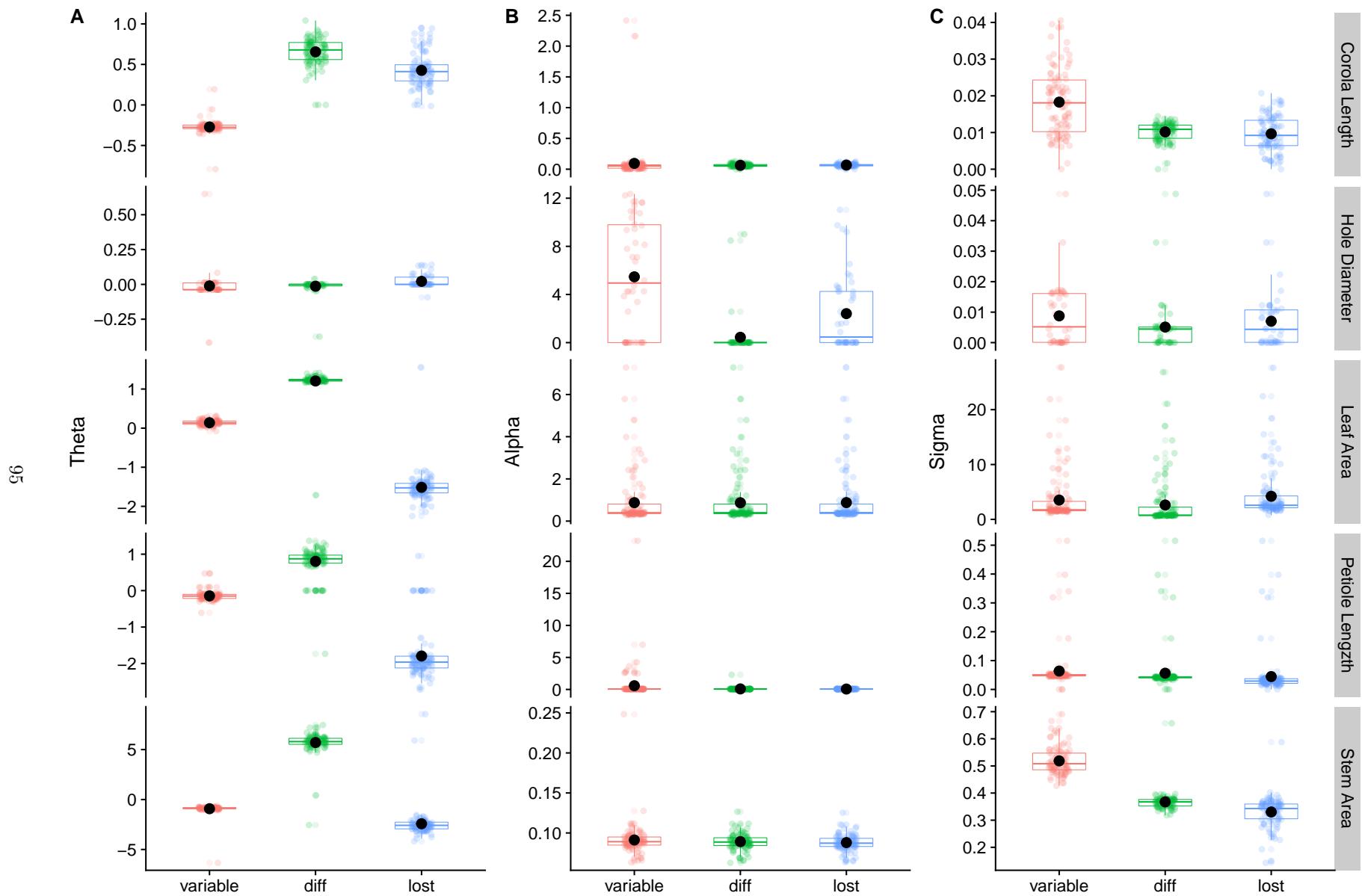


Figure 23: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Warts.

PC2 - Parameter differences

Table 67: Differences in Theta values for PC2 analysis of Warts. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost
variable	0	1	1	0	17	4	0	1	98	0	7	95	0	1	98
diff	95	0	81	29	0	3	98	0	98	92	0	89	99	0	98
lost	95	14	0	42	39	0	1	1	0	4	1	0	2	2	0

Table 68: Differences in Alpha values for PC2 analysis of Warts. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost
variable	0	2	2	0	30	29	0	98	3	0	9	9	0	91	87
diff	76	0	35	0	0	2	1	0	1	0	0	5	9	0	87
lost	76	43	0	1	28	0	96	98	0	0	4	0	13	13	0

Table 69: Differences in Sigma values for PC2 analysis of Warts. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost
variable	0	94	88	0	16	14	0	98	2	0	90	90	0	99	99
diff	0	0	38	0	0	2	1	0	1	0	0	89	1	0	95
lost	6	56	0	2	14	0	97	98	0	0	1	0	1	5	0

PC3 - Parameters

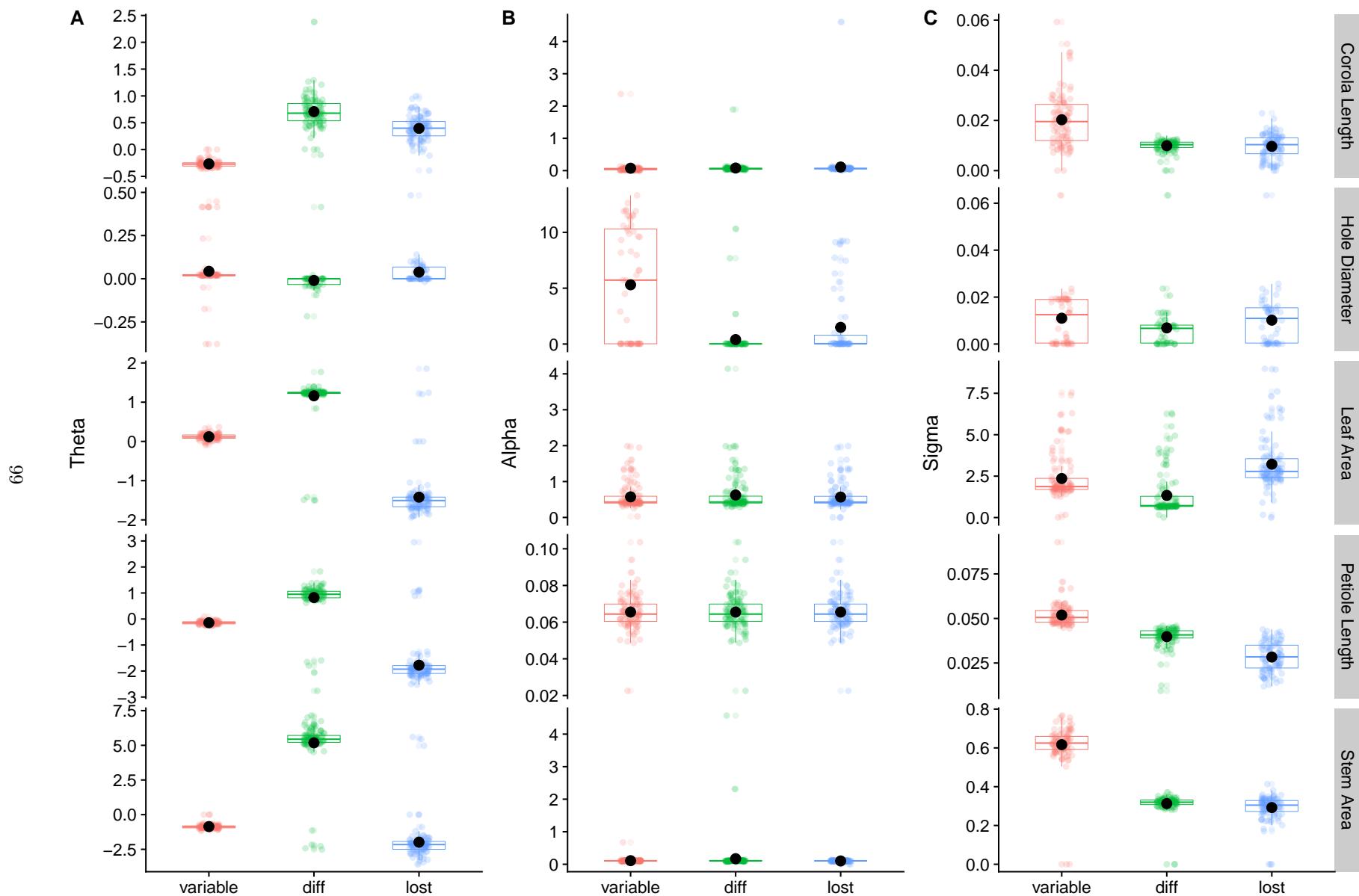


Figure 24: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Warts.

PC3 - Parameter differences

Table 70: Differences in Theta values for PC3 analysis of Warts. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost
variable	0	2	1	0	50	29	0	3	97	0	5	92	0	5	94
diff	96	0	85	4	0	23	97	0	97	92	0	92	95	0	95
lost	97	13	0	25	26	0	3	3	0	5	5	0	6	5	0

Table 71: Differences in Alpha values for PC3 analysis of Warts. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost
variable	0	1	0	0	29	30	0	95	5	0	0	0	0	96	97
diff	83	0	38	3	0	7	5	0	5	0	0	0	4	0	86
lost	84	46	0	2	25	0	95	95	0	0	0	0	3	14	0

Table 72: Differences in Sigma values for PC3 analysis of Warts. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corolla Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost
variable	0	95	87	0	21	17	0	95	5	0	97	97	0	98	98
diff	1	0	35	1	0	1	3	0	3	0	0	92	0	0	72
lost	9	61	0	5	21	0	93	95	0	0	5	0	0	26	0

Hole Diameter - Discrete

PC1 - Parameters

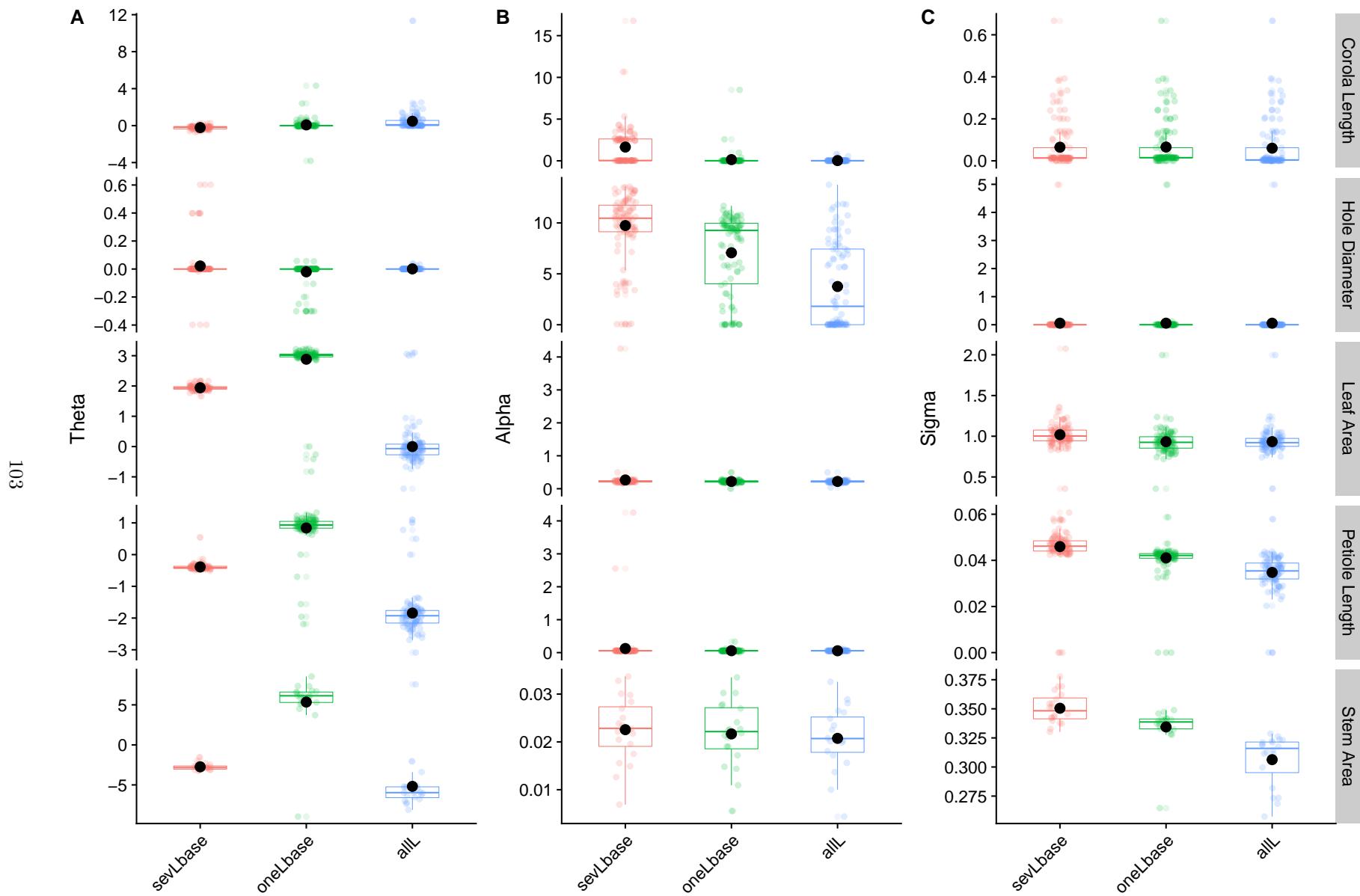


Figure 25: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Hole Diameter - Discrete.

PC1 - Parameter differences

Table 73: Differences in Theta values for PC1 analysis of Holediam.Disc. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL
sevLbase	0	6	6	0	57	50	0	4	96	0	5	93	0	1	18
oneLbase	91	0	3	39	0	21	95	0	95	92	0	92	19	0	19
allL	91	49	0	46	35	0	3	3	0	4	4	0	2	1	0

Table 74: Differences in Alpha values for PC1 analysis of Holediam.Disc. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL
sevLbase	0	46	46	0	66	89	0	99	79	0	2	2	0	18	18
oneLbase	3	0	34	27	0	68	0	0	37	0	0	1	2	0	16
allL	3	15	0	4	24	0	20	62	0	0	1	0	2	4	0

Table 75: Differences in Sigma values for PC1 analysis of Holediam.Disc. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL
sevLbase	0	8	48	0	2	3	0	98	91	0	94	94	0	16	20
oneLbase	43	0	48	1	0	3	0	0	52	1	0	90	4	0	19
allL	3	3	0	0	0	0	7	46	0	1	5	0	0	1	0

PC2 - Parameters

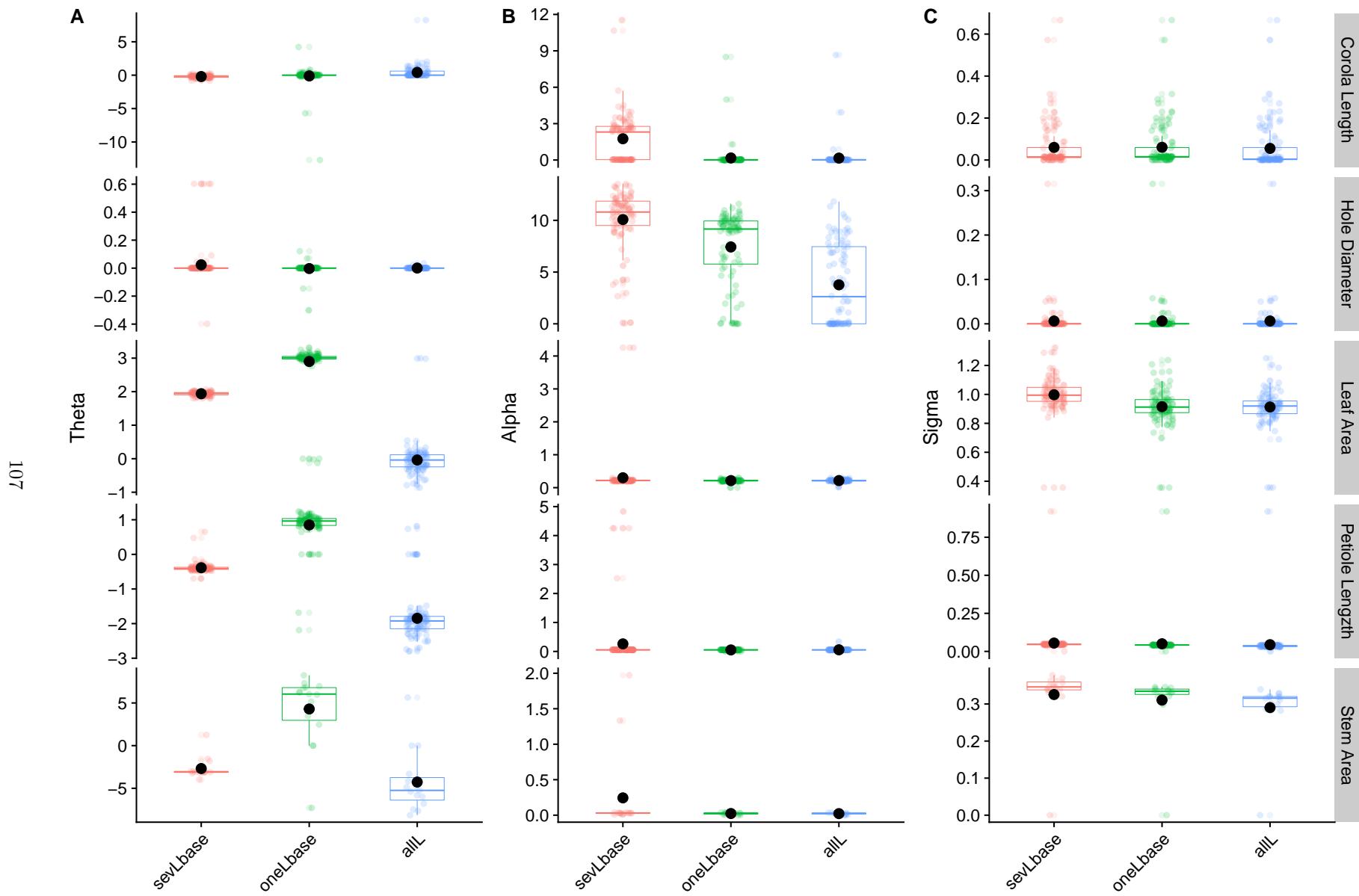


Figure 26: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Hole Diameter - Discrete.

PC2 - Parameter differences

Table 76: Differences in Theta values for PC2 analysis of Holediam.Disc. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL
sevLbase	0	11	11	0	58	59	0	4	98	0	4	91	0	2	13
oneLbase	85	0	3	35	0	23	96	0	96	92	0	90	13	0	13
allL	85	46	0	34	21	0	2	2	0	5	2	0	2	2	0

Table 77: Differences in Alpha values for PC2 analysis of Holediam.Disc. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL
sevLbase	0	50	49	0	69	89	0	100	84	0	5	5	0	14	15
oneLbase	2	0	33	22	0	73	0	0	34	0	0	0	1	0	13
allL	3	19	0	1	18	0	16	66	0	0	5	0	0	2	0

Table 78: Differences in Sigma values for PC2 analysis of Holediam.Disc. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL
sevLbase	0	12	42	0	1	1	0	98	96	0	90	91	0	11	13
oneLbase	34	0	44	1	0	1	0	0	55	1	0	85	2	0	12
allL	4	2	0	1	1	0	2	43	0	0	6	0	0	1	0

PC3 - Parameters

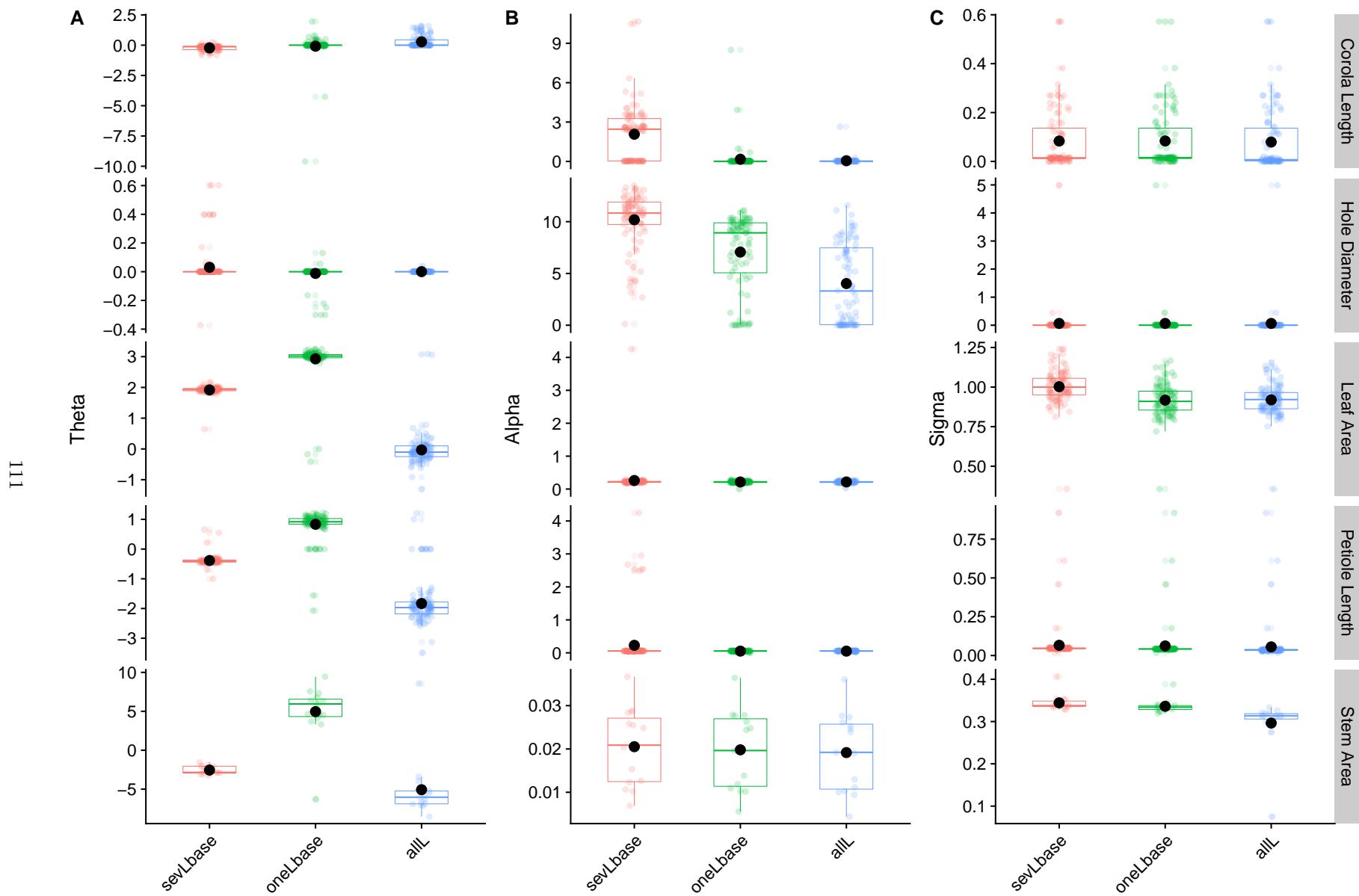


Figure 27: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Hole Diameter - Discrete.

PC3 - Parameter differences

Table 79: Differences in Theta values for PC3 analysis of Holediam.Disc. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL
sevLbase	0	7	4	0	51	50	0	3	98	0	5	94	0	1	14
oneLbase	87	0	3	37	0	33	97	0	97	94	0	92	14	0	14
allL	90	38	0	38	21	0	2	2	0	5	3	0	1	1	0

Table 80: Differences in Alpha values for PC3 analysis of Holediam.Disc. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL
sevLbase	0	57	57	0	73	86	0	99	88	0	6	6	0	13	14
oneLbase	5	0	35	14	0	65	1	0	35	0	0	3	2	0	12
allL	5	27	0	1	22	0	12	65	0	0	3	0	1	3	0

Table 81: Differences in Sigma values for PC3 analysis of Holediam.Disc. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL
sevLbase	0	7	35	0	0	1	0	99	96	0	91	91	0	12	15
oneLbase	30	0	35	1	0	1	0	0	52	2	0	89	3	0	14
allL	2	2	0	0	0	0	3	47	0	2	4	0	0	1	0