Mast-Trait

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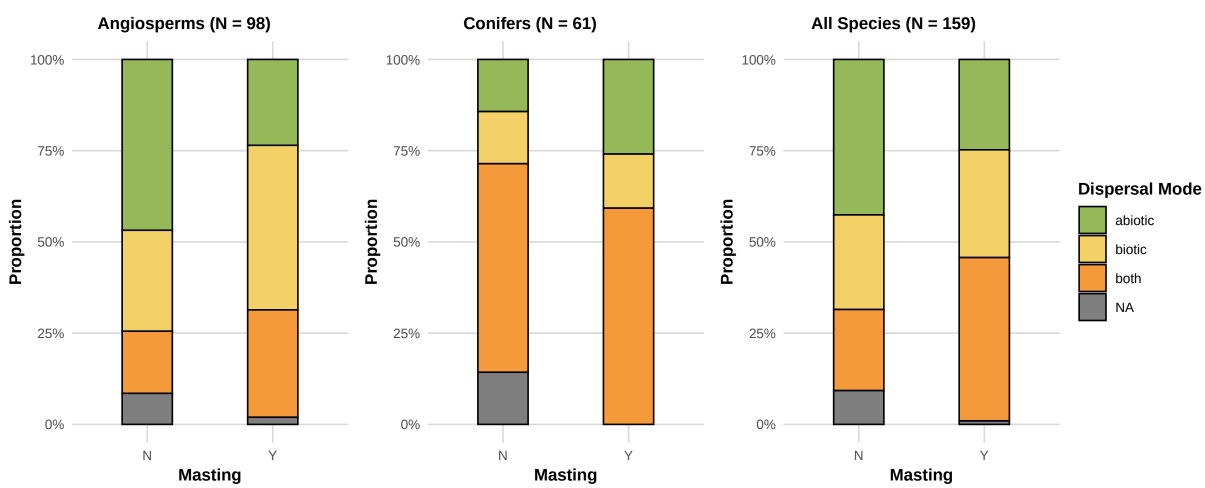
December 27, 2025

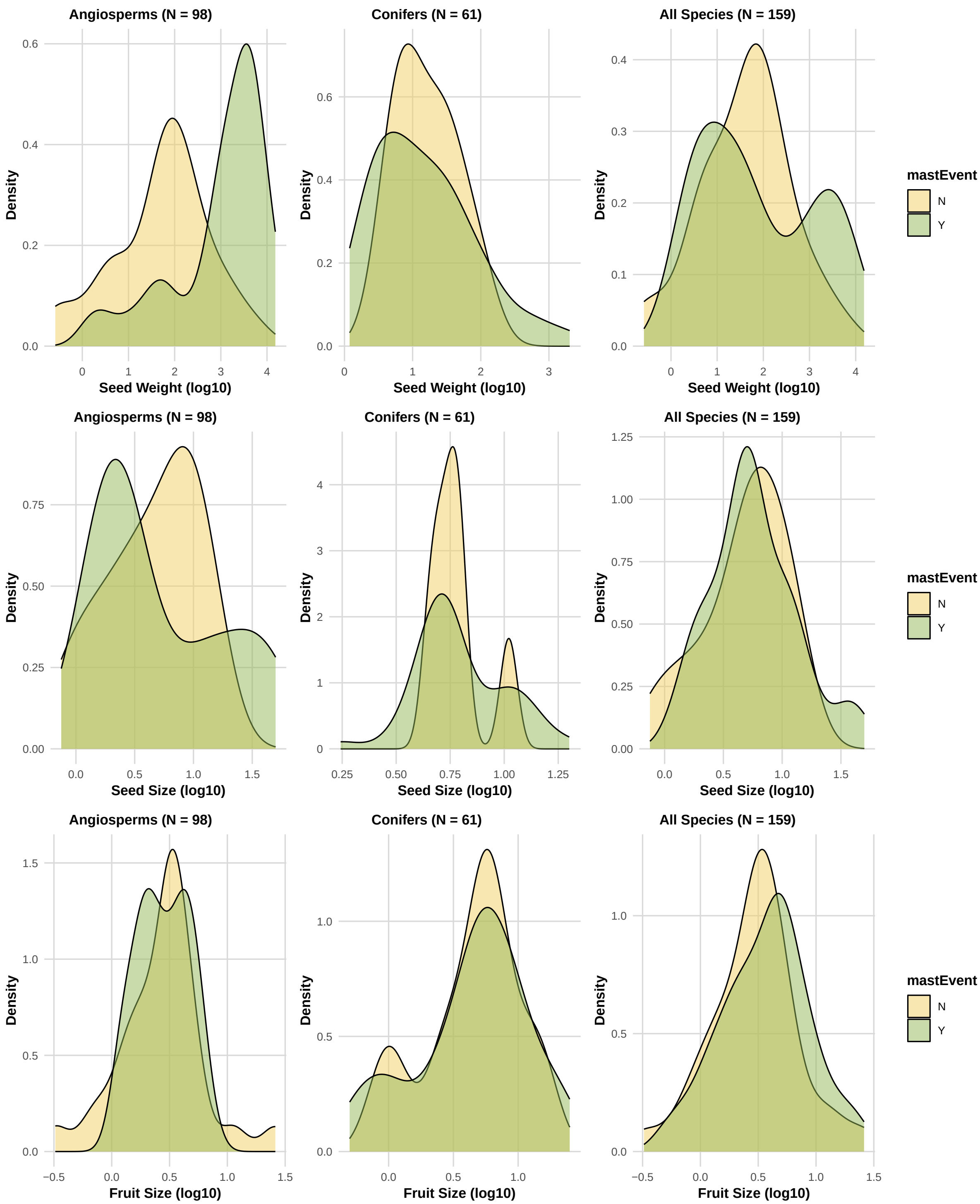
Hypotheses

Predator Satiation

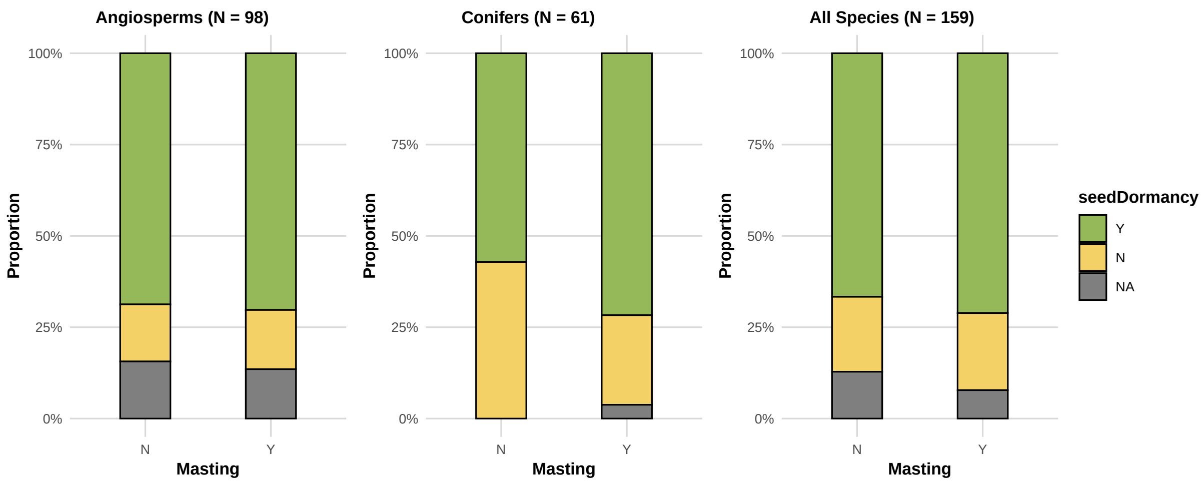
- Dispersal mode: Animal-dispersed species may be more likely to mast, or the mechanisms behind masting could differ depending on dispersal mode.



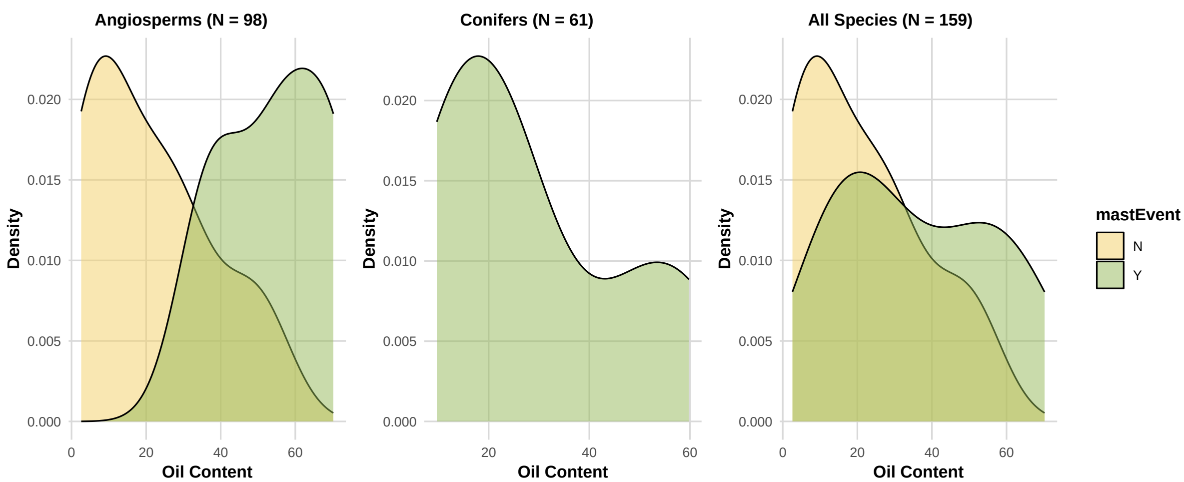
- **Seed size:** Among animal-dispersed species, larger-seeded species might be more prone to masting.



- **Seed dormancy:** Species with dormant seeds are expected to be more likely to mast.

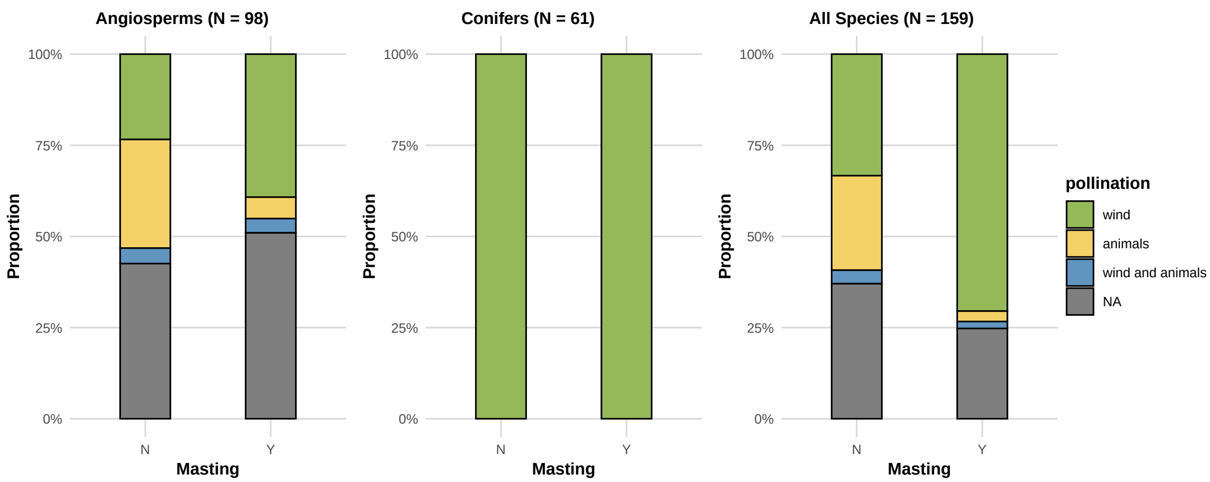


- **Nutrient content:** Species with more nutritious seeds may be more likely to mast.

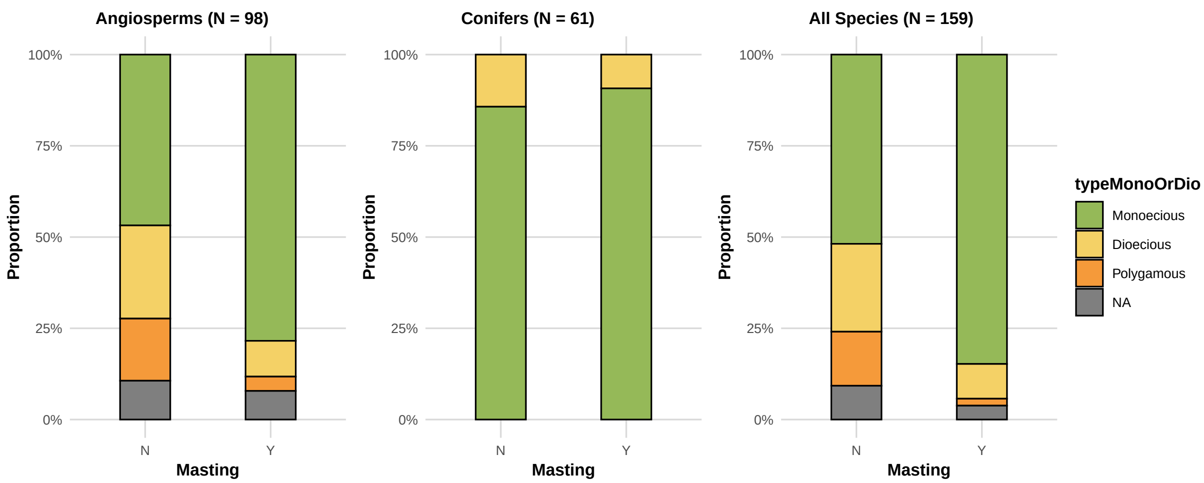


Pollination Coupling

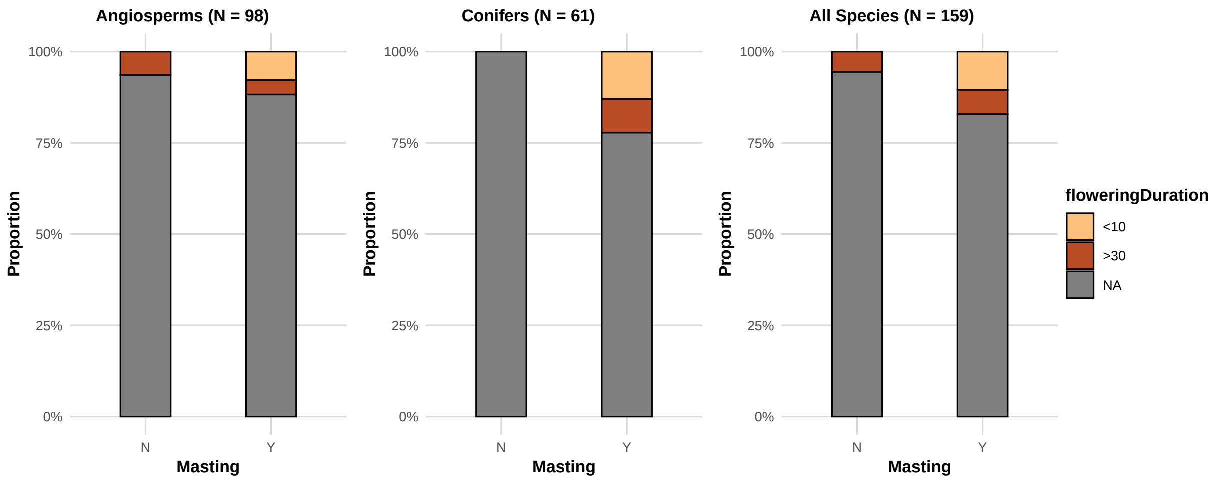
- Wind-pollinated species are expected to mast more frequently.



- Monoecious species may be more likely to mast.

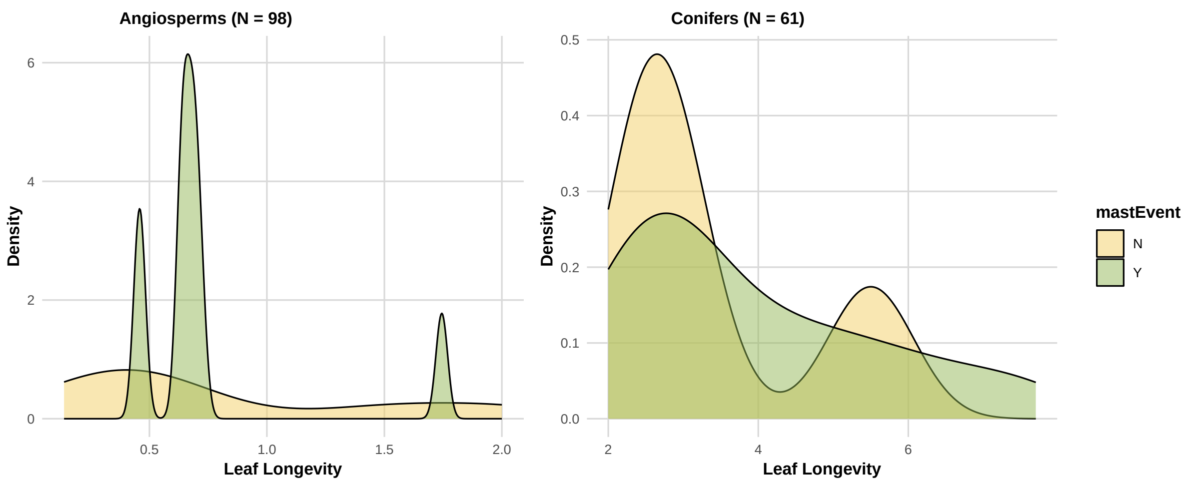


- Species with longer flowering periods may be more likely to mast.

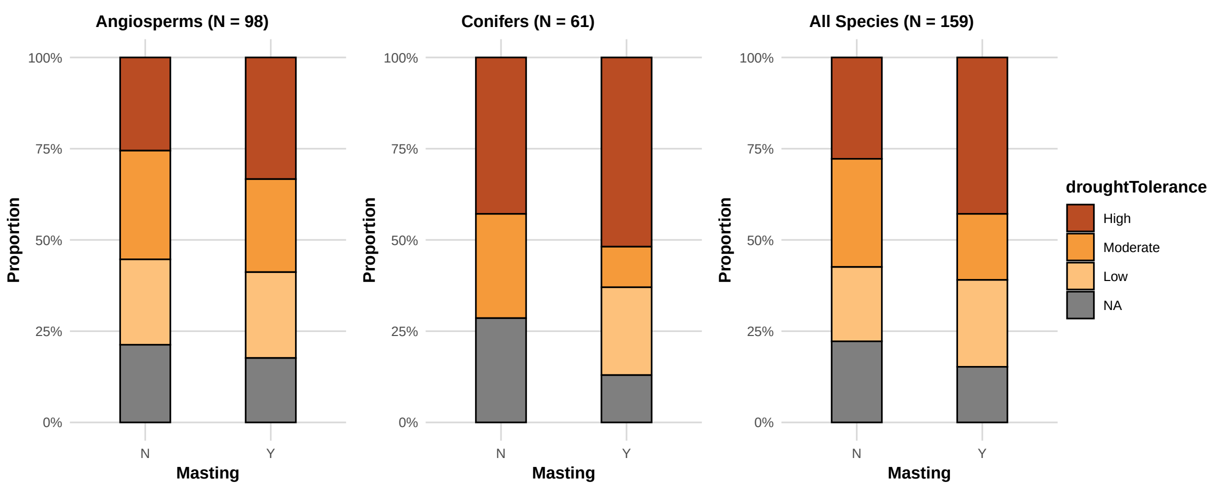

Angiosperms (N = 98)
Conifers (N = 61)
All Species (N = 159)
100%
75%
50%
25%
0%
Proportion
N
Y
Masting
floweringDuration
<10
>30
NA

Resource Matching

- Leaf longevity: Species with long-lived leaves are expected to mast more frequently.

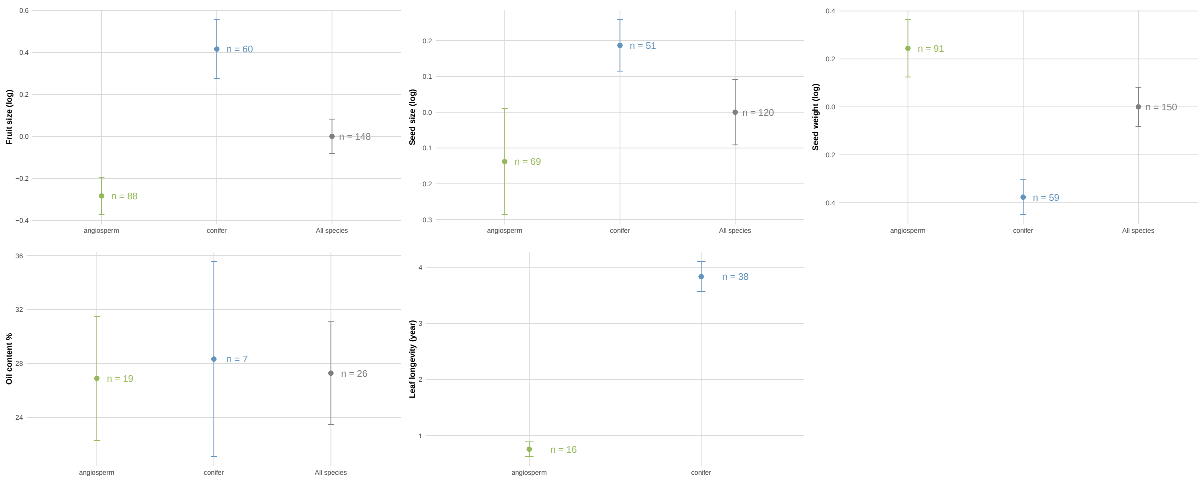


- Drought tolerance: May go either way — tolerant species can accumulate resources; intolerant species respond to resource fluctuations.

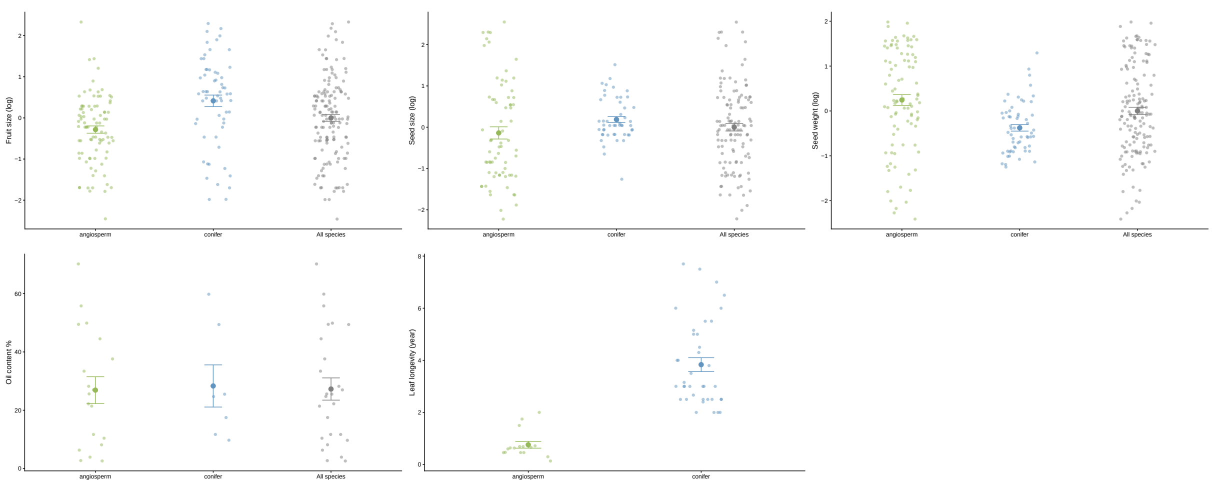


Data visualization

I calculated the mean and standard errors for the continuous traits in the raw dataset, with number of the data.



Here's the version of raw data scattering on the plot



Results

I ran the phyloglm, including the phylogeny variation.Here I reproted the direct model results in a table:

Trait (group)	Predictor	Estimate	SE	Z	P	Sig.	Phylo a
Seed dispersal (conifer)	Biotic dispersed (compared to Abiotic)	−0.830	0.807	−1.03	0.3040		0.015
Seed dispersal (conifer)	Abiotic and Biotic dispersed (compared to Abiotic)	−1.106	0.666	−1.66	0.0968	.	0.015
Seed dispersal (angio)	Biotic dispersed (compared to Abiotic)	0.549	0.533	1.03	0.3030		0.059
Seed dispersal (angio)	Abiotic and Biotic dispersed (compared to Abiotic)	0.552	0.567	0.97	0.3300		0.059
Pollination (angio)	Wind pollinated (compared to Animal pollinated)	1.719	0.723	2.38	0.0174	*	0.346
Pollination (angio)	Wind pollinated (compared to Animal pollinated) and animals	1.225	1.148	1.07	0.2860		0.346
Seed dormancy (conifer)	Dormant	0.706	0.703	1.00	0.3150		0.411
Seed dormancy (angio)	Dormant	0.034	0.497	0.07	0.9460		0.096
Mono/Dio (conifer)	Monoecious (compared to Dioecious)	−1.135	1.017	−1.12	0.2640		0.007
Mono/Dio (angio)	Monoecious (compared to Dioecious)	0.904	0.680	1.33	0.1840		0.110
Mono/Dio (angio)	Polygamous (compared to Dioecious)	−0.129	0.956	−0.14	0.8920		0.110
Seed weight (conifer)	Seed weight (log, std)	−0.047	0.403	−0.12	0.9080		0.427
Seed weight (angio)	Seed weight (log, std)	0.707	0.306	2.31	0.0210	*	0.063
Fruit size (conifer)	Fruit size (log, std)	0.021	0.345	0.06	0.9520		0.428
Fruit size (angio)	Fruit size (log, std)	0.058	0.232	0.25	0.8020		0.171
Seed size (conifer)	Seed size (log, std)	−0.108	0.418	−0.26	0.7960		0.413
Seed size (angio)	Seed size (log, std)	0.269	0.330	0.82	0.4150		0.081
Oil content (angio)	Oil content	0.036	0.028	1.29	0.1980		0.141
Leaf longevity (conifer)	Leaf longevity	0.147	0.345	0.43	0.6700		0.430
Leaf longevity (angio)	Leaf longevity	0.262	0.948	0.28	0.7820		0.007
Drought tol (conifer)	Low drought tolerated (compared to High drought tolerated)	0.908	1.645	0.55	0.5810		0.429
Drought tol (conifer)	Moderate drought tolerated (compared to High drought tolerated)	−1.565	1.065	−1.47	0.1420		0.429
Drought tol (angio)	Low drought tolerated (compared to High drought tolerated)	0.045	0.476	0.09	0.9250		0.110
Drought tol (angio)	Moderate drought tolerated (compared to High drought tolerated)	−0.126	0.465	−0.27	0.7870		0.110

0.1 Dispersal mode

Conifers

- Species being abiotic dispersed have an 82% probability of being strong masting species.
- Species being biotic dispersed and both have a lower probability, but this difference is not statistically.
- Overall, the model provides no evidence that dispersal mode affects whether a species is strong masting or not.

Angiosperms

- Species being abiotic dispersed have an 32% probability of being strong masting species.
- Species being biotic dispersed and both have a higher probability, but this difference is not statistically.
- Overall, the model provides no evidence that dispersal mode affects whether a species is strong masting or not.

0.2 Pollination mode

Conifers

- All the conifers in our dataset are wind pollinated, and they are mostly strong masting species.

Angiosperm

- Animal pollinated species only have a relatively low probability (20%) of being strong masting species.
- Wind pollinated species have asignificantly higher probability (59%) of being strong masting species.
- Species pollinated by both animal and wind have an intermediate change (47%) of being strong masting species, but is not significantly different from animal pollinated ones.
- Overall, pollination mode is an important predictor of whether species has strong masting pattern, because wind pollination increases the odds of strong masting compared to animal pollination.

0.3 Seed dormancy

Conifers

- Species without dormant seeds have 80% probability of being strong masting species.
- Species with dormant seeds have higher probability (89%), but this difference is not significant.
- Overall, the model provides no evidence that seed dormancy affects whether a species is strong masting or not.

Angiosperm

- Species without dormant seeds have 39% probability of being strong masting species.
- Species with domrmant seeds have a very similar probability (40%) of being strong masting species, but the difference is not significant.
- Overall, the model provides no evidence that seed dormancy affects whether a species is strong masting or not.

0.4 Reproductive type

Conifers

- Dioecious species have a higher probability (70%) of being strong masting species compared to monoecious species (44%), but the difference is not significant.
- The very low alpha (0.007) suggests little phylogenetic signal in this trait-masting relationship.
- Overall, the model provides no evidence that reproductive type affects whether a species is strong masting or not.

Angiosperm

- Dioecious species have 28% probability of being strong masting species.

- Monoecious species have higher probability (49%), but this difference is not significant. Polygamous species have similar probability (26%), but the difference is not significant.
- The relatively low alpha (0.11) suggests low to moderate phylogenetic signal in this trait-masting relationship.
- Overall, the model provides no evidence that reproductive type affects whether a species is strong masting or not.

0.5 Drought tolerance

Conifers

- High drought tolerance species have a high probability (91%) of being strong masting species.
- Moderate and low drought tolerance species have lower or higher probabilities (68% and 96% respectively), but differences are not significant.
- Overall, the model provides no evidence that drought tolerance affects whether a species is strong masting or not.

Angiosperm

- High drought tolerance species have a low probability (44%) of being strong masting species.
- Moderate and low drought tolerance species both have lower probabilities (40% and 44% respectively), but differences are not significant.
- The relatively low alpha (0.11) suggests low to moderate phylogenetic signal in this trait-masting relationship.
- Overall, the model provides no evidence that drought tolerance affects whether a species is strong masting or not.

0.6 Seed weight

Conifers

- Seed weight has no significant effect on strong masting pattern
- The moderate alpha (0.43) suggests moderate phylogenetic signal in this trait-masting relationship.

Angiosperm

- Higher seed weight significantly increases chance of being strong masting species, seed weight is a strong predictor of masting.
- The relatively low alpha (0.063) suggests low phylogenetic signal in this trait-masting relationship.

0.7 Fruit size

Conifers

- Fruit size has no significant effect on strong masting pattern.
- The moderate alpha (0.43) suggests moderate phylogenetic signal in this trait-masting relationship.

Angiosperm

- Fruit size has no significant effect on strong masting pattern.
- The relatively low alpha (0.17) suggests low phylogenetic signal in this trait-masting relationship.

0.8 Seed size

Conifers

- Seed size has no significant effect on strong masting pattern.
- The moderate alpha (0.41) suggests moderate phylogenetic signal in this trait-masting relationship.

Angiosperm

- Seed size has no significant effect on strong masting pattern.
- The relatively low alpha (0.08) suggests low phylogenetic signal in this trait-masting relationship.

0.9 Oil content

Conifers

- Not enough data available for conifers.

Angiosperm

- Oil content has no significant effect on strong masting pattern.
- The relatively low alpha (0.14) suggests low phylogenetic signal in this trait-masting relationship.

0.10 Leaf longevity

Conifers

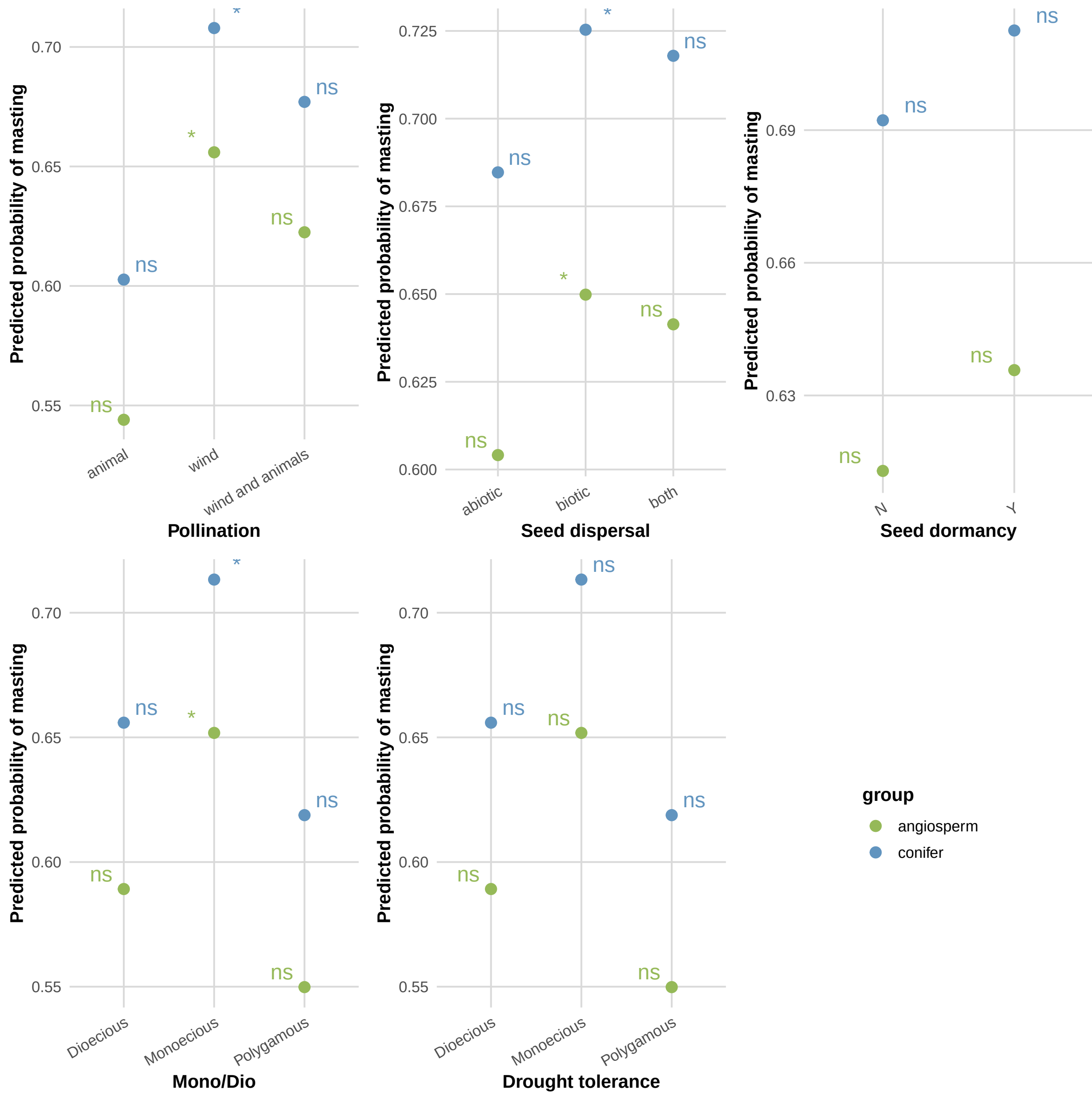
- Leaf longevity has no significant effect on strong masting pattern.
- The moderate alpha (0.42) suggests moderate phylogenetic signal in this trait-masting relationship.

Angiosperm

- Leaf longevity has no significant effect on strong masting pattern.
- The relatively low alpha (0.006) suggests low phylogenetic signal in this trait-masting relationship.

I also ran the common glm, using conifer and angiosperm as a fixed effect in the model, and I modified the results for better visualization:

For the categorical traits, I calculated the probability (of being a strong masting species) for each level:



For the continuous traits, I just presented the effect sizes, with the star indicating a p-value smaller than 0.05: