Masting associated functional traits and seed traits

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Question: What are some functional traits and seed traits are associated with masting? How will that potentially change the reproduction success under the climate change context?

1 Traits selection

There are many hypotheses on mast seeding, including predator satiation, pollination efficiency, environmental prediction, weather cues and resource budget model. We could select traits that help them fit the hypothesis.
Predator satiation:
Size size
Seed nutrient content
Dispersal potential
Seed coat permeability
Seasonality of seed release
Seed defences
Pollinatoin efficiency:
Flowering duration
Environmental prediction:
Seed nutrient content
Seed coat thickness
Resource matching, resource budget:
Longevity
Dormancy
Leaf phenology
leaf longevity
weather cues:

2 Literature Reviews

2.1 Overview

Give Context and brief argument for the need for progress in this research area and what you propose to do, in simple, non-technical terms (for the benefit of non-technical experts). Also briefly emphasize the impact and outcomes from thus work in tangible terms, such as societal benefits

2.2 Annotated Bibliography

- Marcos Fernández-Martínez et al. (2019). "Nutrient scarcity as a selective pressure for mast seeding". In: *Nature Plants*. This paper investigates the evolutionary advantages of masting and tested whether

masting behaviour is associated to foliar nitrogen and phosphorus concentrations when controlling for local climate and productivity. They found that masting intensity is higher in species with low foliar N and P concentritions, which support the hypothesis that masting could be a adaptation for species growing in nutrient limited and imbalanced conditions.

- Valentin Journé, Andrew Hacket-Pain, and Michał Bogdziewicz (2023). "Evolution of masting in plants is linked to investment in low tissue mortality". In: *Nature Communications*. This paper invested interannual patterns of reproductive investment using more than 500 species which includes herbs, graminoids, shrubs and trees. They found that masting is more frequent in species invest in tissue longevity. They have a figure of masting metrics on the spectrum of plant functional traits (fig. 2) is very informative and useful.

- Ian S Pearse et al. (2020). "Biogeography and phylogeny of masting: do global patterns fit functional hypotheses?" In: *New Phytologist*. This study investigates the factors influencing masting. It examines whether it could be explained by adaptive economies of scale or passive mechanisms linked to cliamte variability. They found that factors related to both adaptive benefits of masting and climatic variability were significant predictors of masting. They provides very detailed methods on how they compiled their data which could be a useful resource.

- Tong Qiu et al. (2023). "Masting is uncommon in trees that depend on mutualist dispersers in the context of global climate and fertility gradients". In: *Nature Plants*. The researchers conducted meta-analyses to quantified tree key features of masting: volatility, periodicity and synchronicity. The results indicate that species dependent on mutualist dispersers tend to not mast. Species growing in conditions with different nutrient level also could have different masting patterns.

- Giorgio Vacchiano et al. (2021). "Natural disturbances and masting: from mechanisms to fitness consequences". In: *Philosophical transactions of the Royal Society B*. This paper explores the relationship between natural disturbances and masting in plants. It gives lots of examples of different species following different mechanisms. It also examines how various natural disturbances influence masting. The last paragraph of this paper also provides some insightful questions about masting-disturbance interactions

References

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