To the Editor:

We are submitting the ms “The effect of quantitative genetic processes on eco-evolutionary dynamics of competition” for consideration as a letter for Ecology Letters. Existing theory of coexistence is rooted in trait overdispersion. Yet, many empirical studies have shown that coexistence is often observed with trait clustering. Many ecological and evolutionary causes have been proposed in isolation to explain coexistence in multispecies assemblages. However, a eco-evolutionary framework connecting the processes underlying trait over- or under-dispersion is lacking.

Here, we address the interaction between ecological and evolutionary processes by modeling quantitative genetics of trait-mediated competition of multispecies assemblages. With this framework, we explored the conditions under which coexistence is observed with trait under- or overdispersion. We show that the quantitative genetic process of trait inheritance has a strong and robust impact on the community-level trait and coexistence patterns. We highlight a mechanism where the shape characteristics of intraspecific trait variation modulates the effects of interaction between quantitative genetic processes. i.e., the number of loci affecting the competition trait, and the selection due to competition.

Trait-underdispersion is observed if the impact of diffuse competition is stronger than the pairwise competition. We show that scenarios where traits are determined by a limited number of loci increase the likelihood of such events by deviating the intraspecific trait distributions away from normality. On the other hand, we show that when traits retain their normality under selection, trait overdispersion is consistently observed. These two contrasting conditions impact coexistence patterns in different ways.

There has been an increasing trend of employing functional traits to link the eco-evolutionary processes, competition often being a major component, with the empirical community-level patterns of coexistence. Yet, bringing the focus on the quantitative genetics characteristics of traits which may play a vital role and in conjunction with different ecological contexts, leading to under- or over-dispersion patterns of species coexistence in natural communities.

*Sincerely,*

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