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Introduction

Most plant species, including nearly all of the world's signi cant crops, are symbiotically connected to fungi of the subphylum Glomeromycotina through arbuscular mycorrhizal (AM) symbiosis. Agriculture 2, 3, as well as de ning plant tness, variety, and cohabitation in natural groups 4, 5, all depend on the symbiosis because of its impacts on plant nutrient acquisition and growth. Here, we argue that quantitative genetics, and more speci cally, an integrative approach combining quantitative genetics of the plant host and its fungal partner, could be used to better use the symbiosis to improve agricultural production or to better apply AM fungi (AMF) in ecological restoration or conservation. We look at how quantitative genetics has developed and how it might be applied to both partners before providing a conceptual framework in order to integrate them. We recognize that many ecosystem ecologists and agronomists probably do not nd the subject or technical details of quantitative genetics techniques to be particularly approachable, but we hope to increase their awareness of the potential bene ts of using an integrated quantitative genetics approach to understand the symbiosis in agriculture and ecosystem ecology [2].

Approaches in quantitative genetics are not new. is theoretical and practical framework for identifying genes causing traits that do not inherit according to simple Mendelian principles was developed by Fisher and Wright in the early 20th century6, 7. ese traits are those caused by the cumulative e ects of numerous genes. e factors in uencing the phenotype could be predicted by taking into account continuously varying phenotypes from various individuals in one type of organism and connecting them to minute variations in each individual's genetic make-up. For instance, height is a quantitative feature that is in uenced by between 50 and 200 genes in both plants and animals 8, 9. It is crucial to identify the genes that cooperate to produce

Kummerowia striata (unb.) Schindl, Leonurus artemisia (Lour.) S. Y. Hu, Ixeris polycephala Cass, and Conyza canadensis (Linn.) Cronq make up the majority of the vegetation.

From April to August 2012, a eld experiment was carried out. e selection process involved ve co-occurring plant species that varied in their distribution densities and environmental optimums. Forty 0.5 m 0.5 m quadrats were set up in the eld in the middle of April for each

SAS software was used to conduct linear correlations between oxygen concentration and mycorrhizal status as well as between P. australis density and oxygen concentration (SAS Institute Inc., NC, USA). The elimination of P. australis on soil oxygen and the colonisation of AMF on I. polycephala were both tested using the t-test. In the two-factor design, the GLM techniques were employed to compare the AMF colonisation and shoot biomass of the target I. polycephala.

Discussion

The field study was carried out in a freshwater marshland in Anqing City, Anhui Province, which has a subtropical monsoon climate (116°59′27′′ E, 30°28′08′′ N). The average annual temperature is 16.7°C, and the average annual precipitation is 1500 mm. The Yangtze River is close by the location. Due to microtides, this marsh regularly experienced flooding from May to the middle of August. Phragmites australis (Cav.) Trin. Ex Steud, Polygonum pubescens Blume, Kummerowia striata (Thunb.) Schindl, Leonurus artemisia (Lour.) S.

australis in uences mycorrhizal mutualism, which in turn impacts I. polycephala growth (from April 2012 to September 2012). In the middle of April, forty 0.5 m 0.5 m quadrats were set up in the eld. Ten blocks were created from the 40 quadrats. Quadrats were then at random assigned to one of the following two combinations for each block: Two levels of neighbor treatment (all neighbors removed versus all neighbors removed but with P. australis present) and two levels of AMF (benomyl application versus control) are described here. Application of Benomyl was manipulated. For the P. australis neighbor present treatment, P. australis individuals were kept in the plot and all neighbors of the other species were removed, and then the neighbor e ect re ected the interaction from the P. australis neighbor. In the all neighbors removal treatment, an individual of I. polycephala was chosen as the target plant, and all of the neighbors were removed by cutting the aboveground part. ere were 10 blocks created from the 40 quadrats. e following two combinations of the following two factors were then randomly assigned to quadrats for each block: Two levels of neighbor treatment are used in (1) two levels of AMF (benomyl application versus control) and (2) two levels of neighbor removal (all neighbors removed versus all neighbors removed but with P. australis present). Application of Benomyl was tampered with. For the P. australis neighbor present treatment, P. australis individuals were kept in the plot while all neighbors of the other species were removed, and the neighbor e ect then re ected the interaction from the P. australis neighbor. For the all neighbors removal treatment, an individual of I. polycephala was chosen as the target plant, and all of the neighbors were removed by cutting the aboveground part.

Conflict of Interest

None

Acknowledgement

None