Identifying Genetic Markers Associated with Plant Resilience Phenotypes in Maize

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Abstract

Corn is a cornerstone of the global food supply, but its vulnerability to unpredictable weather patterns, exacerbated by climate change, poses significant challenges to its consistent production. This study aims to enhance maize breeding efforts by identifying genetic markers associated with plant resilience, including the factors of growth rates, stress resistance, disease resistance, overall productivity, and variation in weather. Leveraging previous years of genetic, phenotypic, and drone imagery data from the maize Genomes to Fields project, we conducted a genetic analysis utilizing location-year datasets with varying disease presence, environmental stressors, and weather conditions. The focus was primarily on the anthesis-silking interval (ASI), an essential metric in drought resistance. Machine learning techniques were employed for efficient large-scale data analysis, hypothesis testing, and result interpretation. The outcomes of this research hold immense value for farmers grappling with seasonal droughts and extreme heat. Cultivating crops with a history of weather resilience can serve as a predictive tool, mitigating supply chain disruptions and food shortages, ultimately stabilizing food prices.

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