Science Societies

Dissecting genetics underlying the seasonal vegetation index

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Maize breeding and genetics nursery at the Iowa State University Ag Engineering and Agronomy Research Farm. Photo by Qi Mu.

Efficient and accurate high-throughput phenotyping (HTP) is needed to make connections between DNA polymorphisms and phenotypic traits observed from plants across a season. Unmanned aerial vehicle (UAV) based HTP platforms provide novel opportunities for large-scale proximal measurement of plant traits with high efficiency, high resolution, and low cost.

In *The Plant Genome*, researchers report on the patterns detected across the plant growth from a series of normalized difference vegetation index (NDVI) values extracted from UAV images. With NDVI, the amount of live green vegetation is measured. In addition, they reported the DNA polymorphisms detected to be associated with the changes in NDVI in a large maize population.

From the NDVI data obtained at five time points, the team found that 1,752 maize accessions fell into two groups with different NDVI patterns across developmental stages. In addition, a genome-wide association study (GWAS) using static NDVI values and curve parameters derived from mathematical models as phenotypic traits detected overlapping molecular signals across the maize genome.

With the demonstrated utility of the UAV-based HTP platform, researchers can better understand the interplay among genetic, environmental, developmental, and management factors underlying the plant phenotypes and design improved breeding and selection methods to tackle challenges in agricultural production.

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Wang, J., Li, X., Guo, T., Dzievit, M.J., Yu, X., Liu, P., Price, K.P., & Yu, J. (2021). Genetic dissection of seasonal vegetation index dynamics in maize through aerial based high-throughput phenotyping. *The Plant Genome*.

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