# Integrating Phenomics and Genomics for Yield Prediction in Temperate and Tropical Maize

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**NAPPN Annual Conference Abstract: Integrating Phenomics and Genomics for Yield Prediction in Temperate and Tropical Maize**

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Advances in phenotyping tools, genomic methodologies, and analytics strategies provide new tools to assess germplasm merit; however, more work is needed to integrate these systems into modern plant breeding approaches. The objective of this work is to integrate genomics and phenomics for yield prediction in maize. A panel of 830 temperate and tropical inbred lines were evaluated for their testcross performance in 2018, and a subset of 400 testcross hybrids were evaluated in 2021 and 2022. These experiments were performed in West Lafayette, IN in a randomized complete block design with two replications. Remote sensing data was collected on a near weekly basis throughout each growing season for RGB (red-green-blue), LiDAR (light detection and ranging), and VNIR (visible near infrared) hyperspectral data and grain yield was harvested with a plot combine. Remote sensing traits extracted include canopy cover, plot volume, plant height, and NDVI. A GBLUP genomic prediction model was used to estimate yield performance in 2018 using data collected in 2021 and 2022. Remote sensing traits were estimated at regular intervals throughout each growing season using random regression modelling. Grain yield was estimated using the genomic estimated yield and the remote sensing traits in a machine learning model. Preliminary results indicate remote sensing can improve prediction accuracy of grain yield compared to genomic prediction alone even with data only collected before flowering. Improved prediction accuracy could benefit hybrid selection, increase genetic gain, and reduce cost in a breeding program.