Use of Drones for Crop Yield Prediction

Successful adoption of drone-based remote sensing for crop yield prediction requires selection of growth stage and vegetation indices (VI). In a new article in *Agronomy Journal*, researchers from North Dakota State University report the relationship of VI with corn and sugar beet yield over the growing season in the Red River Valley of the Northern Great Plains.

During 2017–2018 summer, the team collected aerial images using a DJI Matrice 100 drone, equipped with Mi- casonse RedEdge sensor. Three VIs—red NDVI, red edge NDVI, and crop height—were calculated from orthomo- saic imageries using Pix4D software.

For corn yield prediction, red edge NDVI was the best predictor, and the relationship was optimized at the R1 growth stage. Red NDVI was the best predictor for sugar beet root yield and recoverable sugar yield at the V7 or V10 growth stages. Over the growing season, predictabil- ity improved for corn but declined for sugar beet.

Growing season conditions including soil moisture and disease pressure can alter sensor output relationships. The sensitivity of VIs varies with crop, site, and growth stages; therefore, additional studies will be required to confirm algorithms for corn and sugar beet in the region.


Optimum Nitrogen Rates for Maize and Wheat in North Carolina

Nitrogen (N) decision making and the selection of the “right” N rate in wheat (*Triticum aestivum* L.) and maize (*Zea mays* L.) is difficult due to complex interactions in the N cycle with weather, management, location, and genetics.

In a recent *Agronomy Journal* article, researchers report on multi-site, multi-location, five-year nitrogen rate study in the coastal plain of North Carolina on corn and wheat. One hundred corn and 79 wheat on-farm trials were established to reflect grower nitrogen rate with additional treatments of ±25% nitrogen.

Results found that farmers were doing a very good job of applying appropriate amounts of N to their wheat and that the state’s N rate database recommendations were adequate for optimum production. For corn, about 60% of North Carolina farmers could have dropped their nitrogen rates by about 25% without significantly affecting yield; the nitrogen rate database was adequate for corn. Doppler-based precipi- tation estimates from the National Weather Center explained 90% of the average maize yield variability.

Results suggest that improved approaches to N rate selection and N efficiency will likely require in-season adjust- ments to yield-based N rates that incorporate local manage- ment and environmental conditions throughout the growing season.


Amitava Chatterjee, co-author of the article, explaining the use of drones to growers at a field day in Minnesota.

A North Carolina State University researcher applying N fertilizer. Over 175 on-farm trials were performed between 2013 and 2017 as part of a North Carolina Farmer Network focused on optimizing N rates in wheat and corn.

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