Large-scale Unmanned Aircraft System (UAS) for Field Crop Management

The Situation
The Large-scale UAS Project is a new approach to UAS applications to crop and livestock management. Project personnel used the Hermes 450 large UAS and several small UAS to collect high-resolution imagery for use in precision field crop management decisions.

Steele and Traill County Extension Agents coordinated the relations between the land owners, crop and livestock producers, and private sector partners by leading several public meetings in Steele and Traill Counties throughout the project. The county Extension personnel facilitated the transfer of image data from NDSU to individual land owners and producers within the corridor.

Project personnel collaborated with the Northern Plains UAS Test Site to get approval for the project activities from the Federal Aviation Administration and the Federal Communications Commission. Project personnel also collaborated with the Hillsboro Regional Airport Authority to operate the Hermes 450 UAS from the Hillsboro Airport.

Extension Response
This system collected 1.5” pixel-size imagery over 40,000 acres per hour flying at 8,000’ above the ground in a 100,000 acre corridor in Traill and Steele Counties. Imagery was collected in May, June, July and August at 4,000’, 6,000’, and 8,000’ altitudes using the large UAS, and low altitudes using the small UAS.

Outcomes to date include: 1) successfully collecting imagery over the 100,000 acre corridor at the various altitudes in May, June, July and August; 2) transferring and storing the approximately ten terabytes of imagery on the NDSU CCAST computers; 3) conducting six public meetings with local residents from the image collection corridor; 4) conducting three public UAS field days at the Hillsboro Airport; 5) correlating imagery to crop data collected on the ground; 6) begun discussions between land owners, producers and private sector interests on privacy and private property issues; and 7) demonstrated the safe and efficient use of a large UAS to collect high-resolution imagery over large areas. This project is ongoing and will continue during the 2017 crop growing season.

Impacts
UAS technology is a new and rapidly developing technology for crop and livestock production in North Dakota, across the nation and throughout the world. New Federal Aviation Administration rules released on August 29, 2016 allow the use of UAS for commercial activities in the United States. North Dakota Crop and livestock producers are keenly interested in selecting UAS equipment, managing and processing imagery collected with UAS, and particularly in analyzing the data and implementing it into their crop and livestock management schemes. This project is leading the way to provide this information to ND producers.

Feedback
“We could do things like manage our in-season nitrogen applications, maybe more precisely than what we’ve been able to do before,” Lovas said. Among other things, it could make on-ground crop consulting much more focused, rather than random.

Further, Lovas talked about how the system can provide surface elevation data that is precise and updated to current times. And in the Red River Valley, where the land is very flat, having data in places where there is less than a foot of drop could be very beneficial data for surface drainage. Ag Week, August 29, 2016

Contact
John Nowatzki
Extension Ag Machine Systems Specialist
1221 Albrecht Blvd.
701-231-8213
John.Nowatzki@ndsu.edu