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Subfield Level Model for Improved Nitrogen Fertilizer Recommendations

Technology No. 2019-048

Integrates spatially precise data and GIS data

This technology is a software based model for precision application of nitrogen-based fertilizer where soil conditions change drastically over a large field. The software integrates the EPIC (Environmental Policy Integrated Climate) field (or subfield) based agroecosystem model with a geographic information system (GIS) database. It creates a simulation “template” for every unique location in a field, whether large scale (e.g. hectares) or small scale (e.g. individual plant). For each unique location, it performs a secondary calibration using any spatially precise data available (e.g., crop yield maps, aerial images indicative of crop biophysical parameters or soil characteristics) collected over any time scale.

Improves nitrogen fertilizer recommendations

Agroecosystem modeling, used for generating nitrogen (N) fertilizer recommendations, is traditionally performed at the field scale or larger. Such field level models result in an entire field getting the same fertilizing recommendation. Because of inherent variability within a field, these recommendations are not always accurate and could lead to using excess fertilizer (resulting in surface and groundwater pollution) or using insufficient fertilizer (resulting in yield losses). Another reason current nitrogen modeling tools are less accurate is that they lack sufficient calibration. This novel approach takes the traditional modeling one step further by performing a secondary calibration using data with high spatial resolution. The software integrates remote sensing and crop systems model to spatially determine in-season nitrogen stress. The new model provides better nitrogen fertilizer recommendations which improves crop nitrogen efficiency and reduces the likelihood of nitrate contamination of water resources.

Phase of Development

- Proof of concept.

Benefits

- Improved nitrogen fertilizer recommendations
- Improves crop nitrogen efficiency
- Reduces the likelihood of nitrate contamination of water resources

Features

- Precision agriculture agroecosystem model
- Integrates field (or subfield) based agroecosystem models with geographic information system (GIS)
- Secondary calibration using high spatial resolution data
- Calibration of the EPIC (Environmental Policy Integrated Climate) model for precision agriculture applications
- Spatially determines in-season nitrogen stress

Applications

- Precision agriculture
- NItrogen fertilizer application
- Nutrient management plans (USDA-NRCS code 590)

Researchers

David Mulla, PhD
Professor, Soil, Water and Climate
External Link (www.swac.umn.edu)

Publications

Utilization of Spatially Precise Measurements to Autocalibrate the EPIC Agroecosystem Model
Proceedings of the 14th International Conference on Precision Agriculture, June 24 – June 27, 2018 Montreal, Quebec, Canada

Interested in Licensing?

The University relies on industry partners to further develop and ultimately commercialize this technology. The license is for the sale, manufacture or use of products claimed by the patents. Please contact us to share your business needs and licensing and technical interests in this technology.

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