

Impact of Variable Rate Irrigation on Consumptive Use of Water Resources

- Derek M. Heeren, Ph.D., P.E.
 - UNL Department of Biological Systems Engineering
- Co-PIs: Daran Rudnick, Ph.D., and Francisco Munoz-Arriola, Ph.D.
- Collaborator: J. Burdette Barker, Ph.D.
- USGS 104(b) funding amount: \$20,000
- Duration: June 2017 to May 2018

August 29, 2017

Nebraska Water Center (NWC) Advisory Board

Objectives

- Quantify impact of VRI on consumptive use of water resources
- Continue a field-scale evaluation of VRI

Tasks Undertaken

- Hired M.S. student (Sandeep Bhatti)
- Hired undergraduate research assistant (Isabella Possignolo)
- Interview of students: <https://www.youtube.com/watch?v=uMLyZaUhlYI&t=58s>
- Two field sites
 - ARDC, Mead, southeastern Nebraska, corn and soybeans
 - BWL, Brule, western Nebraska, corn
- Irrigation treatments
 - Conventional irrigation
 - Variable rate irrigation (VRI)
- Monitoring soil water, crop physiology, etc.

Principal Findings

- Will calculate consumptive use after the growing season
 - Compare conventional irrigation to VRI
- Cumulative irrigation to date (preliminary data for 2017):

| | Mead Corn | Mead Soybean | Brule Corn |
|------------------------------|-----------|--------------|------------|
| Conventional Irrigation (in) | 3.0 | 2.0 | 8.3 |
| VRI (in) | 3.2 | 3.0 | 8.5 |

- Good VRI management requires much effort
- Clouds problematic for satellite data → transitioning to unmanned aircraft

Significance/Impact

- Supported a 3rd year to strengthen field trial results
- VRI not expected to reduce consumptive use
 - The benefits of VRI are likely being overestimated
 - Reduced pumping does not necessarily result in more water available for downstream users
- Key output: Extension publication on the benefits of VRI

Future Funding Plans

- Nebraska Natural Resources Commission (NRC) Water Sustainability Fund
 - 2018 summer: Submit proposal
 - 2017 season will provide preliminary data
- Recent USDA AFRI funding enhances this research