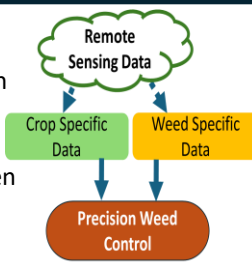


## BACKGROUND

- Small-scale research limitations:** Crop and weed management strategies are traditionally evaluated in small-plot research experiments, limiting scalability.
- Challenges in large-scale farms:** Spatial and temporal variability in large-scale farms often hinder the application and recognition of best management practices tested under small plot research.
- Role of remote sensing:** Remote sensing provides an effective tool to identify spatio-temporal variability of best management practices, enabling the application of precision crop and weed management practices



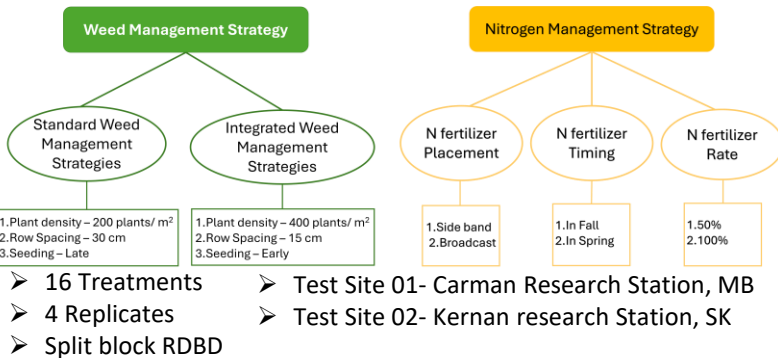
## GOAL

To investigate the potential of using drone-based remote sensing to monitor the response of crop and weeds for diverse crop and weed management strategies in wheat.

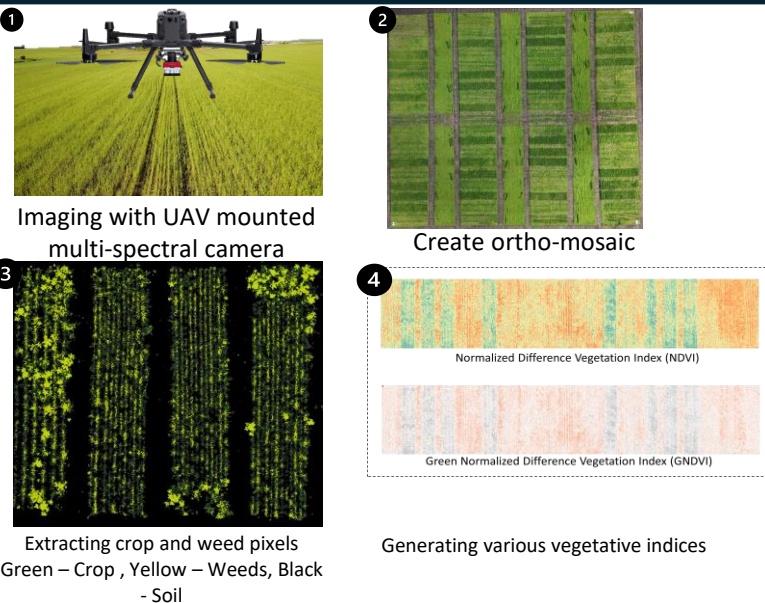
## HYPOTHESIS

Crop and weed responses to agronomic practices are reflected in changes in their spectral signatures (vegetation indices) and structural forms (ground cover), which can be detected remotely and used to develop crop monitoring tools across large landscapes.

## EXPERIMENTAL SETUP



## METHODOLOGY



## RESULTS

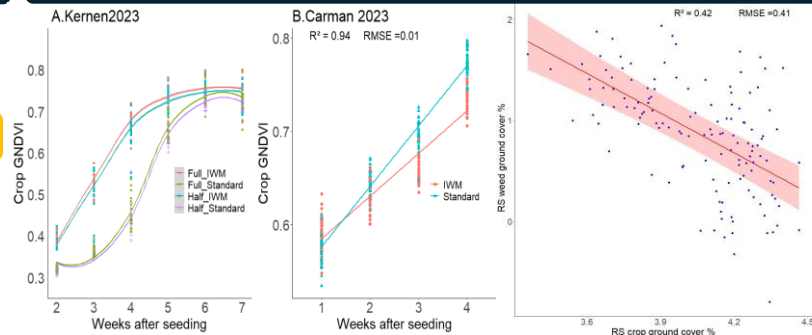


Figure 01 : Crop spectral features (GNDVI) change over time due to weed management and soil N rate at Kernan 2023 (Figure 1A), and due to weed management at Carman 2023 (Figure 1B).

Figure 02: Relationship between remote sensed crop ground cover and remote sensed weed ground cover at Carman 2023.

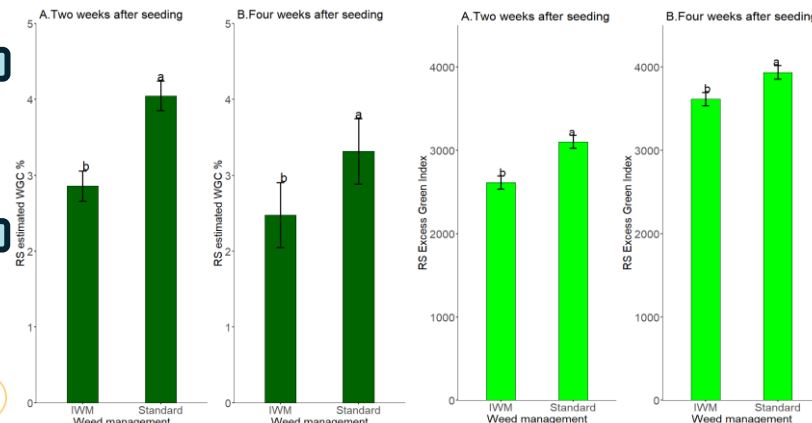


Figure 3: The effect of weed management practices on remote sensed weed ground cover percentage at two weeks (Figure 3A) and at four weeks (Figure 3B) after seeding at Carman 2023.

Figure 4: The effect of weed management practices on weed spectral features (Excess Green Index) at two weeks (Figure 3A) and at four weeks (Figure 3B) after seeding at Carman 2023.

## CONCLUSIONS

- Green Normalized Vegetative Index (GNDVI) detected temporal responses of crops for IWM strategies.
- Remotely sensed crop and weed ground cover showed an inverse relationship, indicating the potential of using crop ground cover as a weed suppression tool. IWM reduced weed ground cover by 26% and 19% in the second and fourth weeks after seeding.
- IWM treatments decreased weed EXG index which indicating stress for weed due to high competition from the crop.
- The impact of fertilizer treatments was not well reflected in RS data due to the dry weather that prevailed in 2023

## TAKE HOME MESSAGE

Remote sensing has a significant potential for agronomic decision-making in large-scale farms in Western Canada.

## REFERENCES

- Blackshaw, R.E., Molnar, L.J. and Janzen, H.H. (2004) 'Nitrogen fertilizer timing and application method affect weed growth and competition with spring wheat', *Weed Science*, 52(4), pp. 614–622. Available at: <https://doi.org/10.1614/WS-03-104R>.
- Che'Ya, N.N., Dunwoody, E. and Gupta, M. (2021) 'Assessment of Weed Classification Using Hyperspectral Reflectance and Optimal Multispectral UAV Imagery', *Agronomy*, 11(7), p. 1435. Available at: <https://doi.org/10.3390/agronomy11071435>.