# Mapping and Managing Canada Thistle (Cirsium arvense) with Drone-Based Precision Tools

Sasha Loewen, University of Manitoba, Department of Plant Science
sasha.loewen@umanitoba.ca

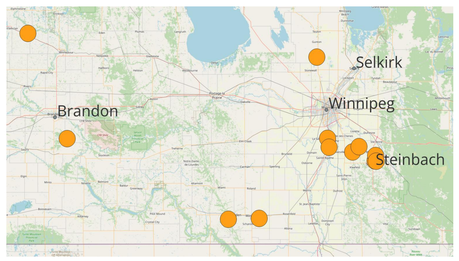
## 1. Introduction

Canada thistle is a major challenge in organic farming systems due to its deep and lateral roots, and perennial nature [1,2].

Using drones, researchers and farmers alike can map perennial weeds [3] and create informed management choices, targeting weeds spatially and temporally for maximum reduction.

## 2. Methodology

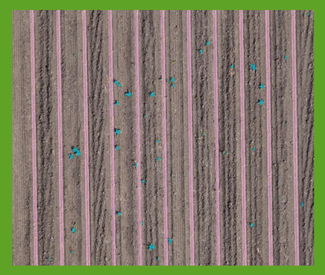
We collected drone imagery across multiple resolutions, seasons, and crops from ten farmer and research fields in Manitoba. Some of the sites deployed variable seeding rates to combat thistle presence.

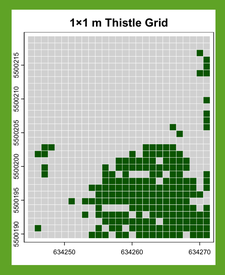



Organic farm sites in Manitoba.

DJI Mavic 3E, with RTK and multi-spectral camera, was used to collect imagery.

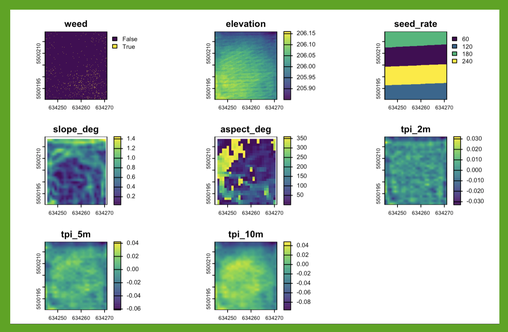
## 3. Results





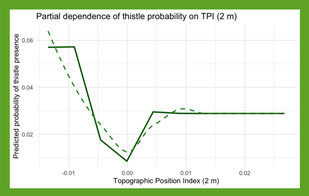

Fly drone, collect imagery, build thistle map

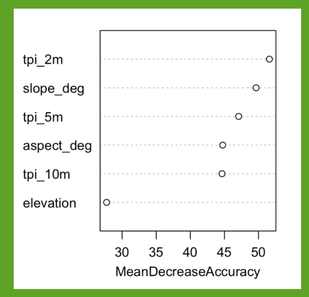
### i. Discover




Build random forest model to describe thistle presence against topographic and other field-based variables

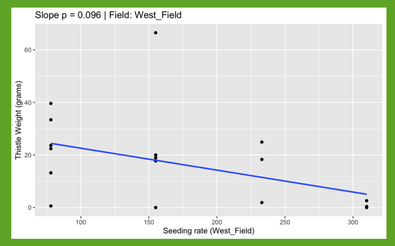
### ii. Describe




Topographic position index (TPI), i.e. localized elevation, consistently predicts thistle presence

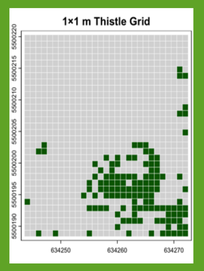
### iii. Destroy




Farmer manages thistle in method of their choosing, here increased seeding rates [4] effectively applied against thistle patches

### iv. Document

Re-assess seasonally to determine management effectiveness




## 4. Future Work

Explore targeted non-chemical control against perennial weeds in organic systems using a variety of tools and assess effect over time.

## 5. References

**1. Favrelière, E., Ronceux, A., Pernel, J. & Meynard, J-M.** (2020). Nonchemical control of *Cirsium arvense* in arable systems: A review. *Agron. Sustain. Dev.* **40**, 31.
**2. Orloff, N., Mangold, J., Miller, Z. & Menalled, F.** (2018). Meta-analysis of field bindweed and Canada thistle management in organic systems. *Agric. Ecosyst. Environ.* **254**, 264–272.
**3. Weigel, M.M., Andert, S. & Gerowitt, B.** (2023). Patch expansion as an indicator of non-chemical control effects on *Cirsium arvense* in spring wheat. *Agronomy* **13**, 1474.
**4. Loewen, S. & Maxwell, B.D.** (2025). Site-specific weed management using variable-rate seeding and simulation. *Weed Res.* **65**, e12669.

## Funding from:

MANITOBA ORGANICS