

USING DRONE DATA TO DETERMINE THE FINANCIAL IMPACT OF WINTER KILL IN WINTER WHEAT

Drones are an instrumental tool for assisting farmers in making important financial decisions regarding winter wheat.

Since this particular crop is highly susceptible to winter kill, Deveron UAS has completed a study focused on determining the economic impact of winter kill using UAV technology and economic calculations.

Our goal is to allow growers to objectively make the right decisions on whether to keep all or part of a given field or to replant completely.

Using drones, we tracked a winter wheat field from planting in the fall to emergence the following spring.

The drones provided Normalized Difference Vegetation Index (NDVI) image and zone maps to determine areas of poor, moderate and excellent survivability.

Based on individual costs of production this data can help growers more accurately determine the most economically viable course of action.

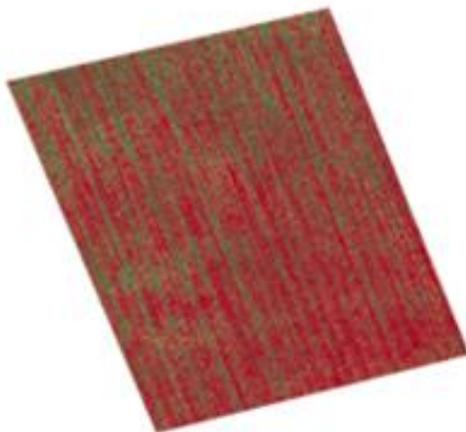


Figure 1: Taken in the fall post-emergence showing normal growth areas

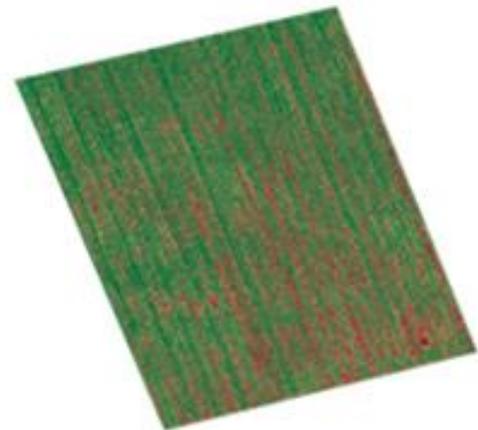


Figure 2: Taken in the spring revealing areas of normal growth and winter kill

A Glance at the Wheat Market:

- There are over 50 million hectares of agricultural land classified as suitable for long-term cultivation in Canada.
- Wheat is the most cultivated crop in Canada, grown on an average of 10 million hectares.
- Half of all Canadian wheat is grown in Saskatchewan, followed by Alberta and Manitoba.

Results

Using the drone data collected in the fall and spring, we are able to create an image using NDVI values that illustrates areas of poor, moderate and excellent survivability among the crop.

Based on the percentage of the field affected by winter kill, the grower can make an objective decision as to whether or not to abandon the crop, or replant a portion of the field in question.

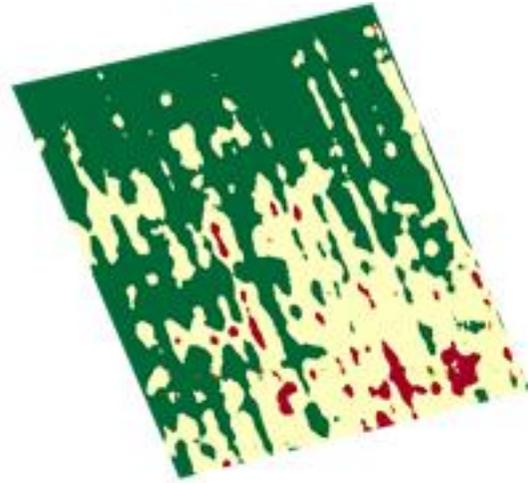


Figure 3: NDVI data reveals 5% poor, 40% good and 55% excellent crop survivability.

Economic Value Drivers

✓ Seed	Certified v. Bin Run
✓ Planting	Self v. Custom
✓ Fertilizer	Fall v. Spring Applications (and overall soil requirements)
✓ Herbicide Treatment	Required/Not Required
✓ Insurance	Crop Insurance Premiums v. Payouts if Reseeding
✓ Value of Rotation	Economic Benefit of Crop in Rotation to Other Subsequent Crops

Deveron UAS Break Even Calculator

Using NDVI imagery, zone maps and the above variables, the grower can objectively devise the most economical course of action based on break-even points.

Since every grower's break-even point is different, Deveron UAS has developed a "Winter Wheat Break Even Calculator" to assist growers in the decision making process based solely on economic factors.

[Contact us](#) to receive a copy and determine how to maximize your Return on Investment (ROI).

A Closer Look:

In some cases a grower may maximize revenues and loss minimization by choosing to replant only a portion of the field.

In this example, the grower has a break even threshold of 70%, meaning that if winter kill exceeded 30% of the field the financial loss to the grower would be minimized by replanting the entire field.

Beyond this threshold, the input costs exceed the available outcomes remaining.

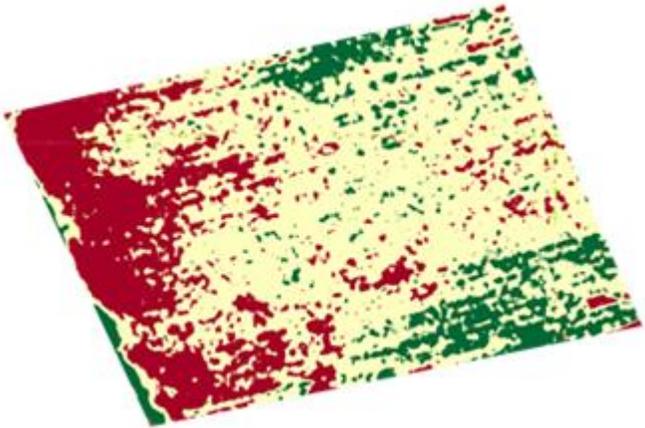


Figure 4: Drone data shows a winter wheat field partially affected by winter kill. The grower's best course of action is to replant the non-surviving portion.

Conclusions

- UAVs are a powerful tool for reducing/eliminating human error in the decision-making process of winter wheat farming.
- Growers are able to avoid erroneous results and over-estimating the amount of winter kill on a given lot.
- Using NVDI data in conjunction with relevant economic factors, growers can make accurate management decisions on the viability of winter wheat crop.



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