

# Analyzing drone images to estimate if wheat is injured from herbicides

## Background:

To breed for herbicide-resistant wheat, we need to know which plants become injured by herbicides

## Question:

We wanted to see if injury scoring could be standardized and automated by analyzing images from drones

## Methods:

We planted two plots of different varieties of winter wheat, sprayed one plot with herbicide (Metribuzin), measured their heights, and took injury scores based on color

After the sprayed plants were injured, we flew a drone to take images of the plots

We expected to see color differences in injured and uninjured plots because herbicides cause yellow spotting and overall less light absorption

We compared Normalized Difference Vegetation Index (NDVI, a calculated metric of plant health based on color) to injury scores and plant height differences, which are both indications of herbicide injury

## Discussion:

Alone, our drone images could not fully predict if wheat is injured

Images could be used in conjunction with other data to estimate injury in the future

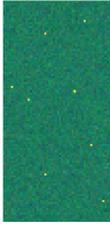
Funded by USDA

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Summer 2022 FACT: Research Experience for Undergraduates on Phenomics Big Data Management

## Expectations

Table 1. **Fabricated** expected differences between susceptible and resistant wheat varieties with fabricated images.

	No Spray		Spray		
Resistant					
	NDVI	0.4	-	0.4	= 0
	Injury	N/A		0	
Susceptible					
	NDVI	0.4	-	0.2	= 0.2
	Injury	N/A		40	
	Plant Height	40	-	36	= 4

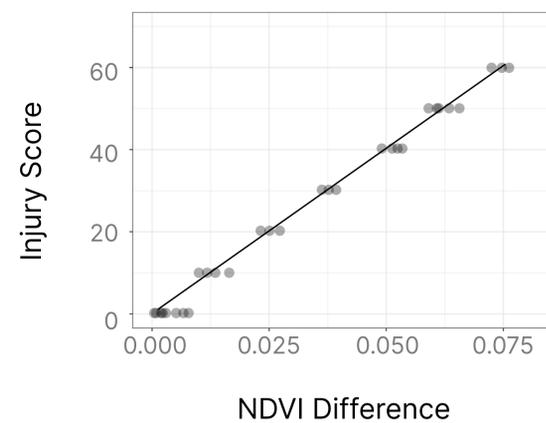


Figure 1. **Fabricated** expected correlation between NDVI difference and injury score.

## Observations

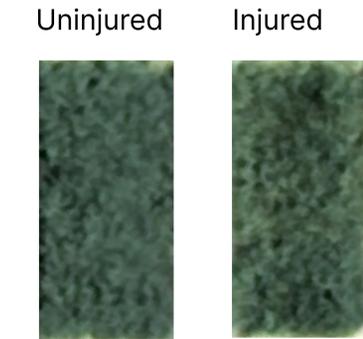


Figure 2. **Real** images of injured and uninjured plots. Both plots were sprayed with herbicide.

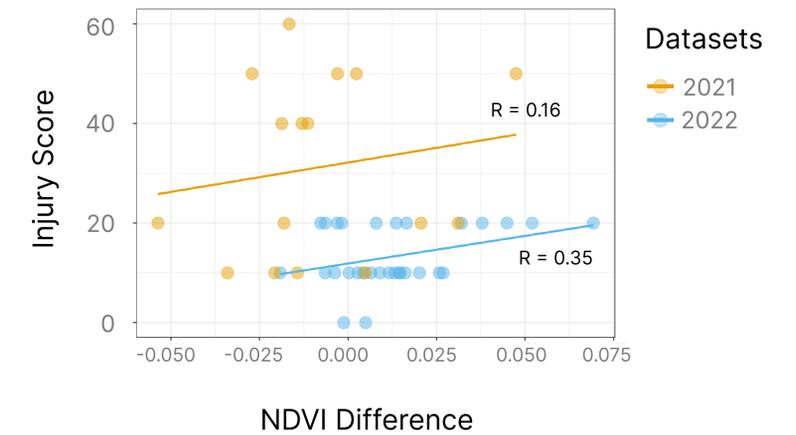


Figure 3. **Observed** relationship between NDVI difference and injury score. (2021, n = 16; 2022, n = 30)

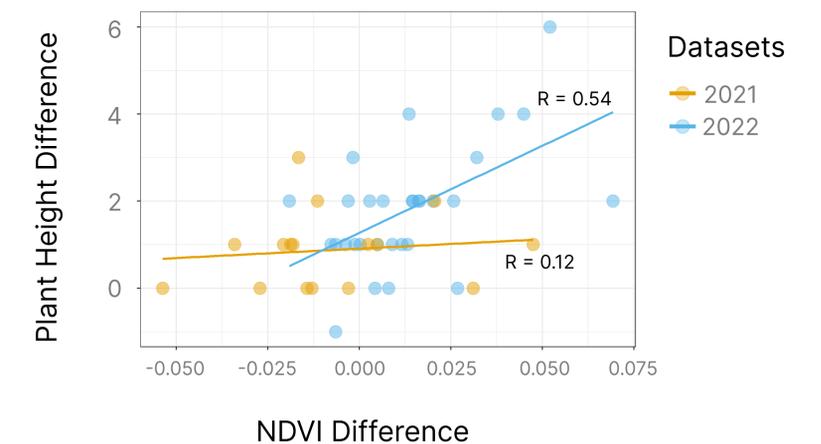


Figure 4. **Observed** relationship between NDVI difference and plant height difference. (2021, n = 16; 2022, n = 30)