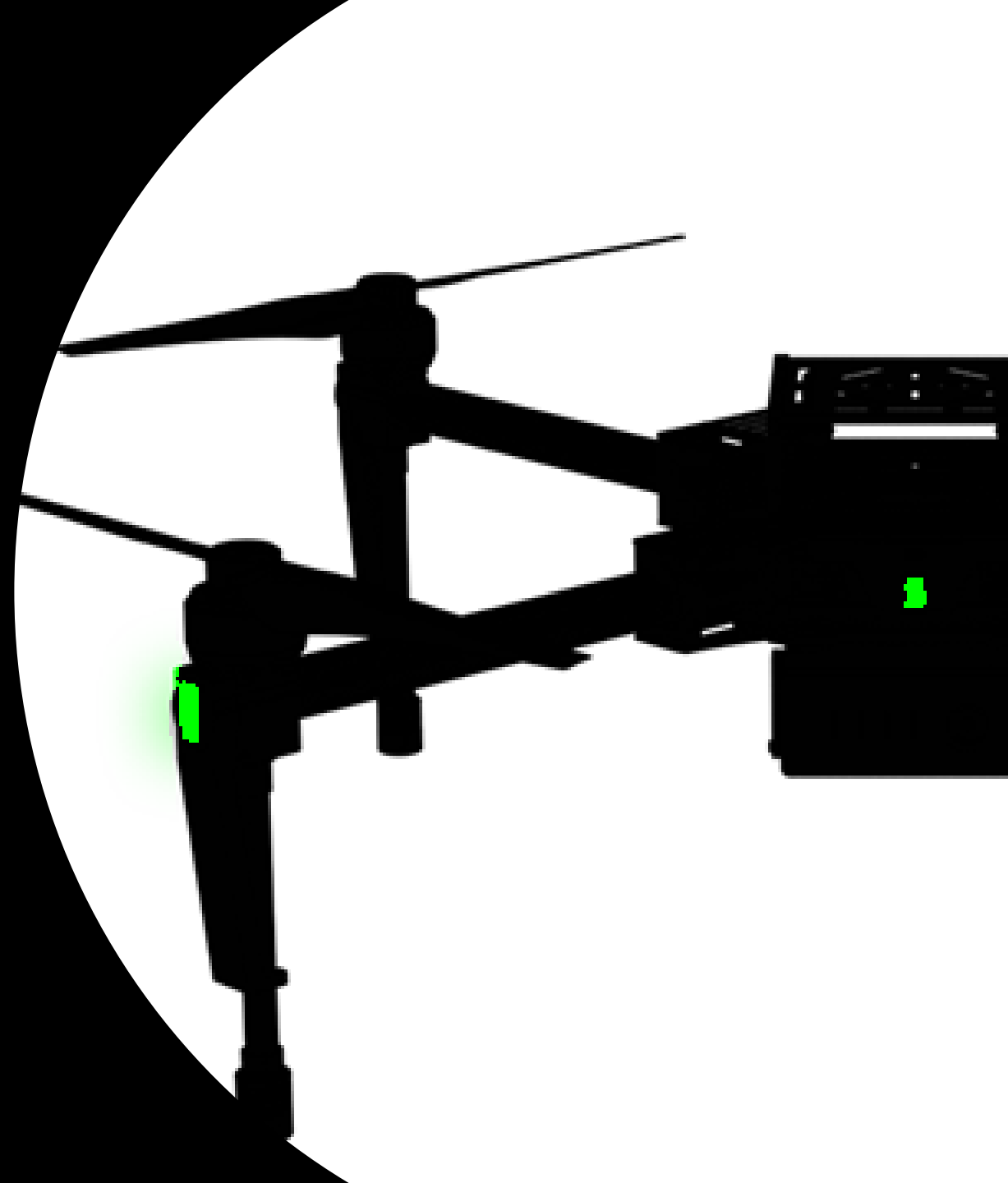


UAV Based Detection of 2,4-D Injury in Cotton Using Vegetation Indices

Ubaldo Torres
Texas Tech University



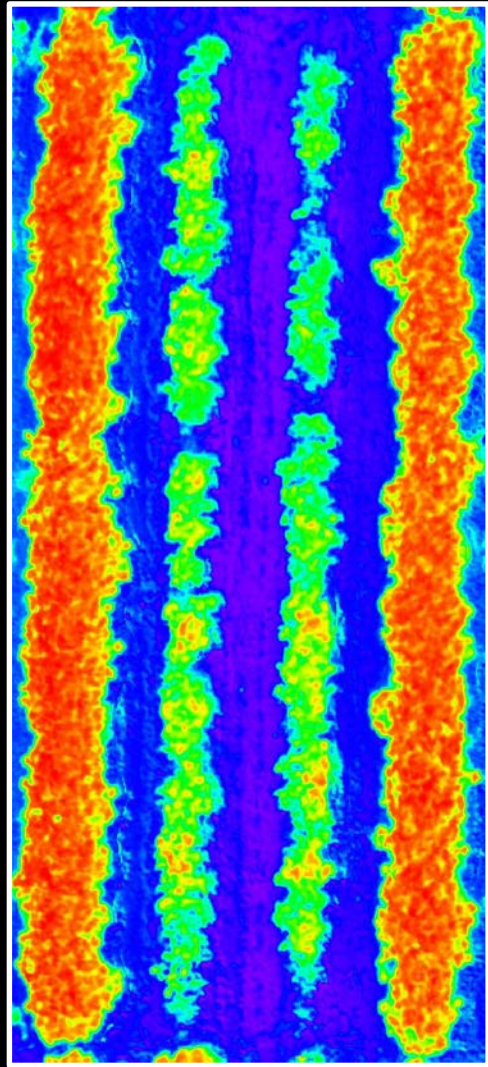
Objective

- Determine non-Enlist™ cotton response to low rates of 2,4-D using different vegetation indices.

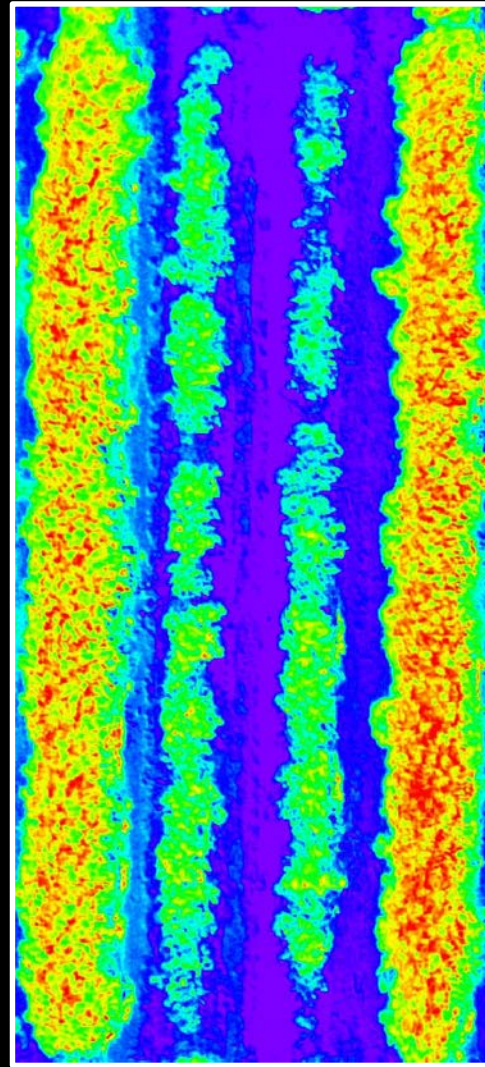




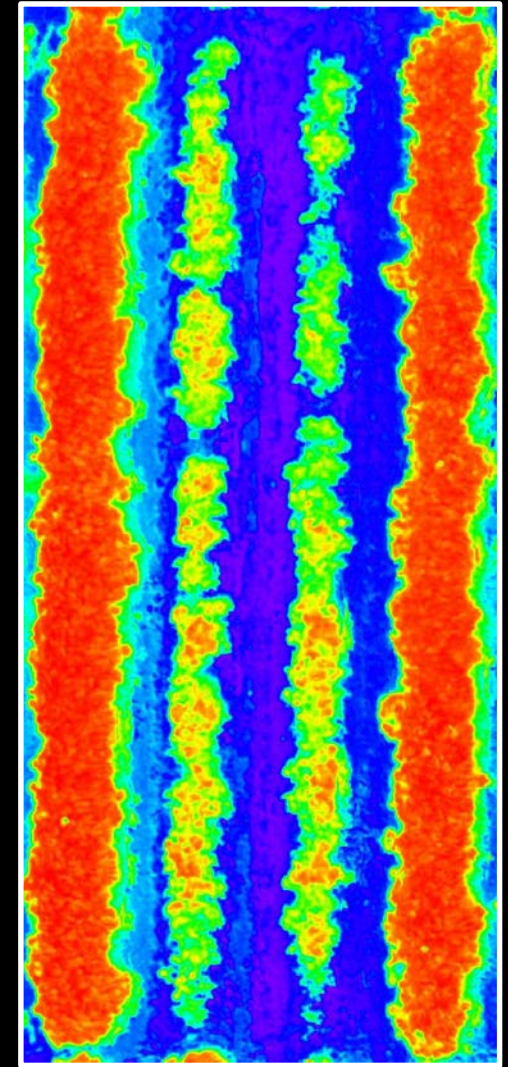
- Matrice 100
- Slanrange multispectral sensor.
- Flown at 100 ft above ground.



NDVI

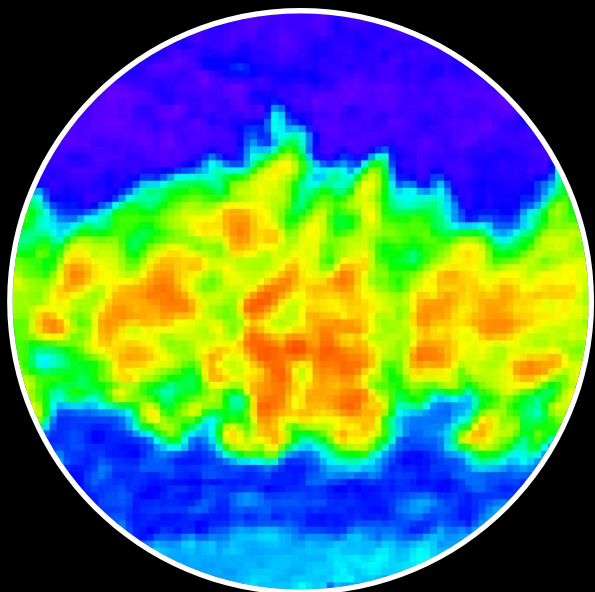


NDRE



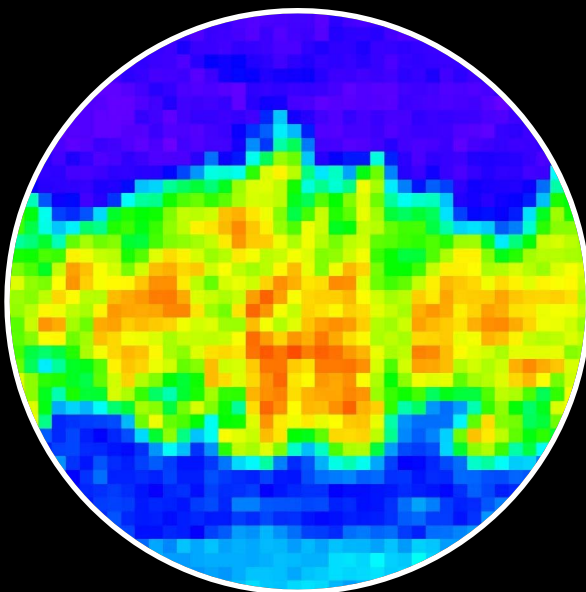
OSAVI

1X



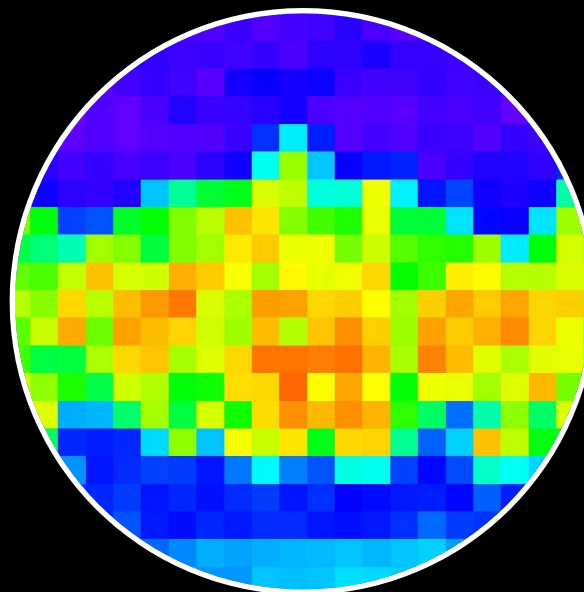
1.2 cm/pixel

2X



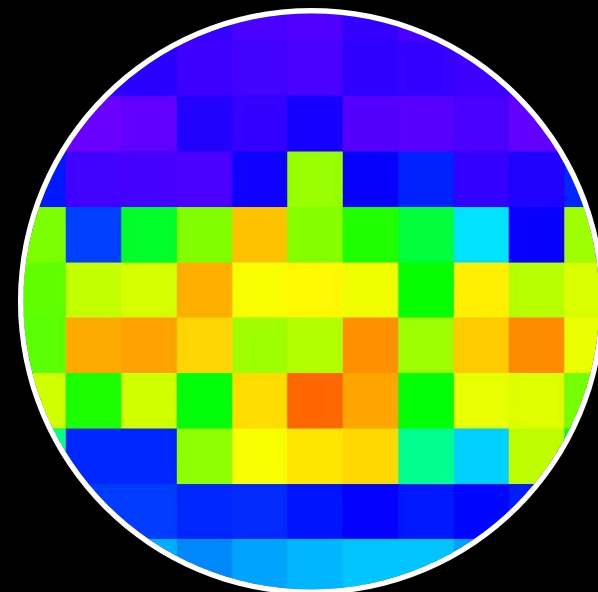
2.4 cm/pixel

4X



4.8 cm/pixel

8X

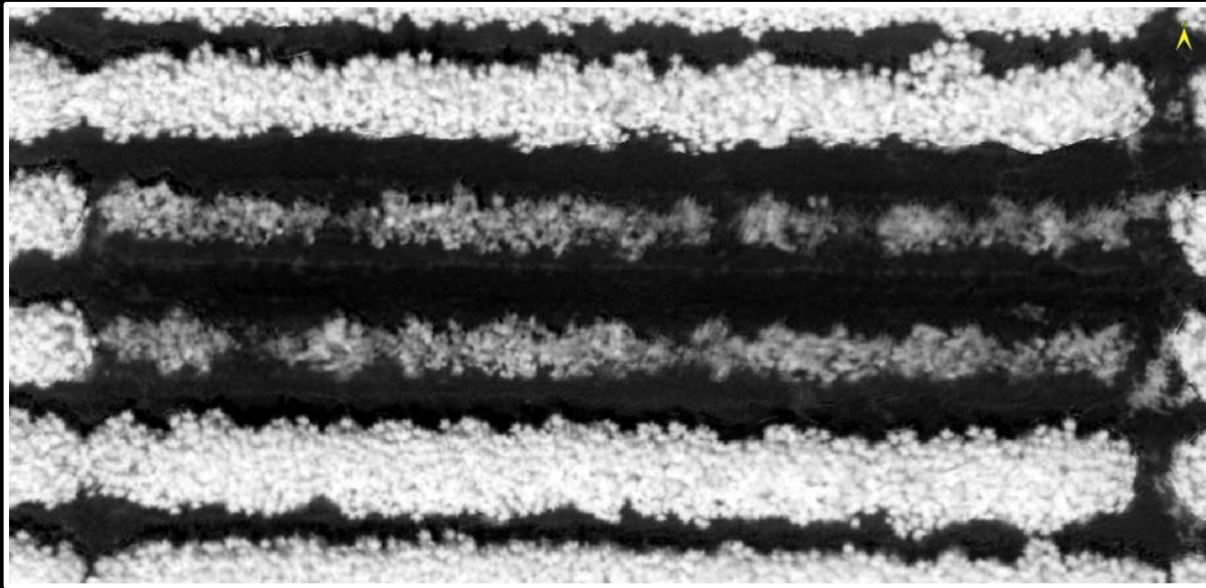


9.6 cm/pixel

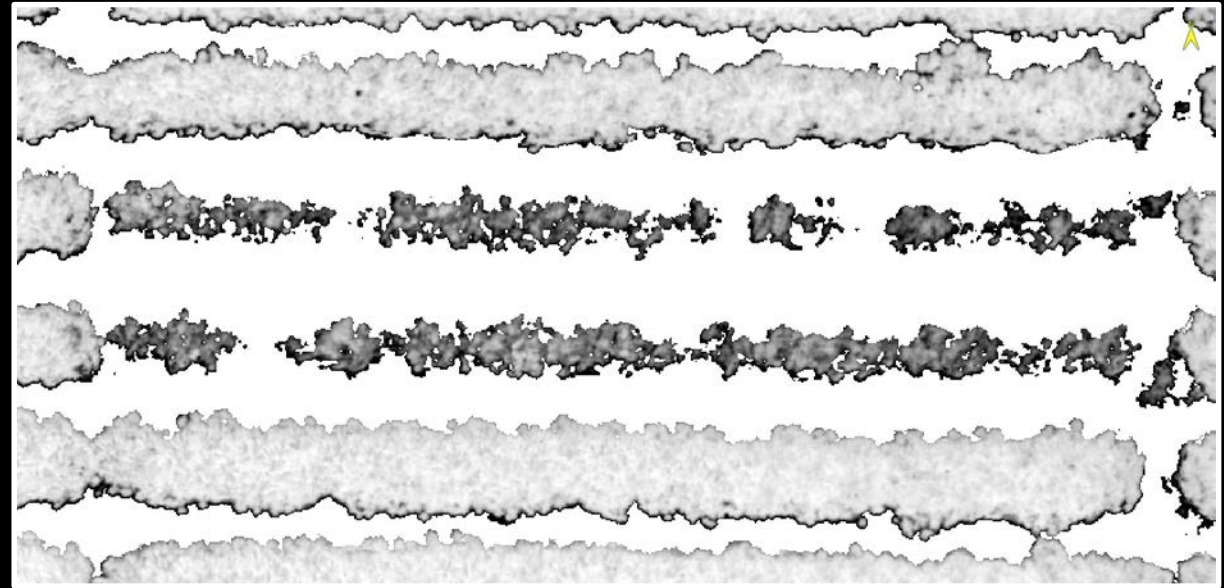


Pixel size increases
(lower resolution)

SOIL INCLUDED



SOIL REMOVED





Untreated

Photos: Kyle Russell



Photos: Kyle Russell

1/1000X



0.95 lb. ai/A

1/500X



Photos: Kyle Russell



Photos: Kyle Russell

1/100X



1/50X



1/10X



Photos: Kyle Russell



Photos: Kyle Russell

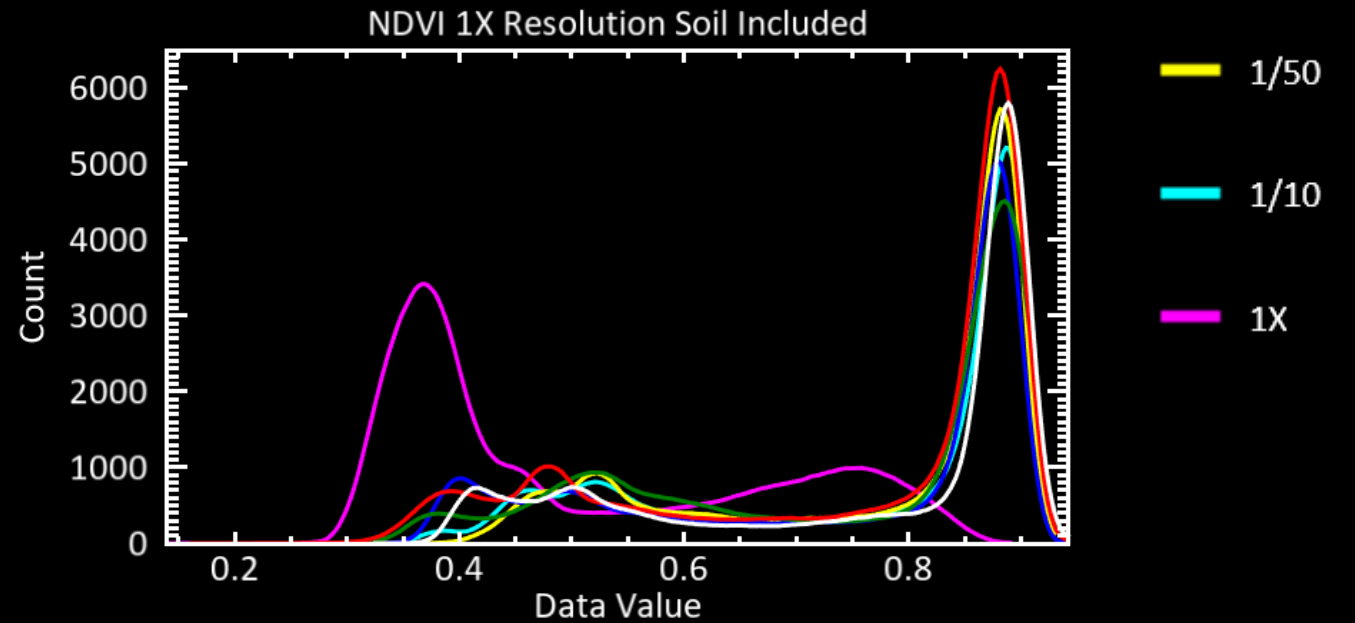
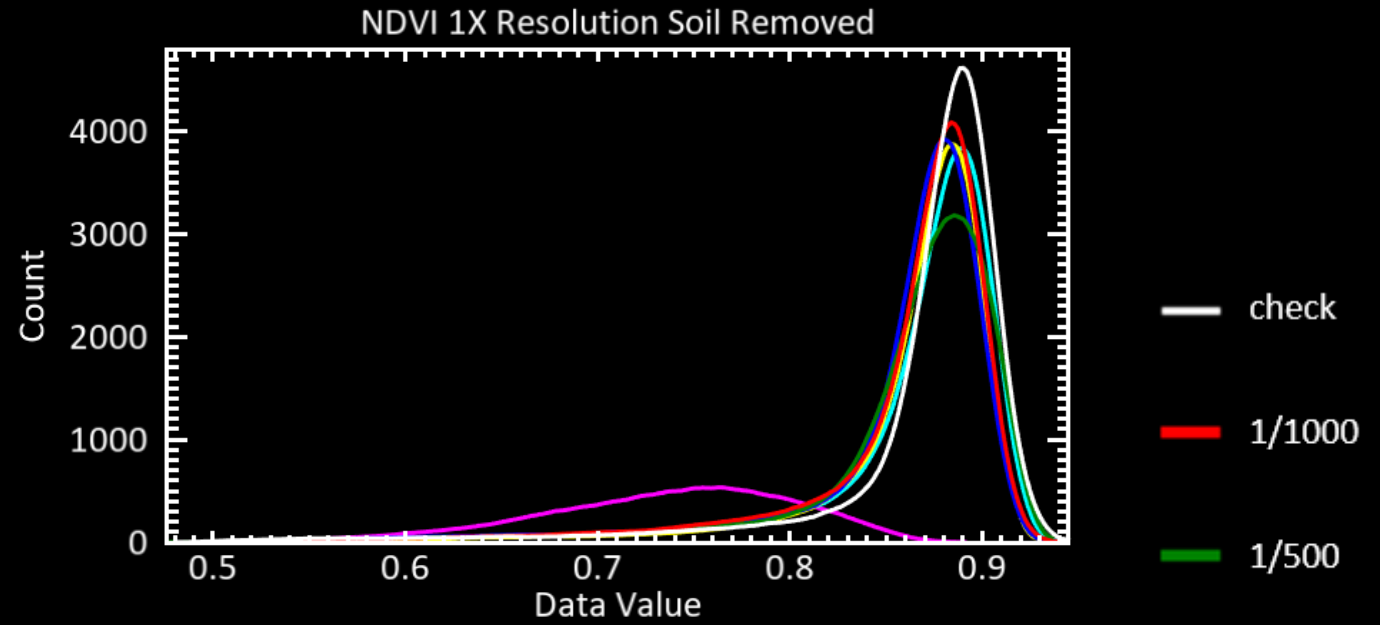
1X



NDVI

Table 1. NDVI values at 1X resolution

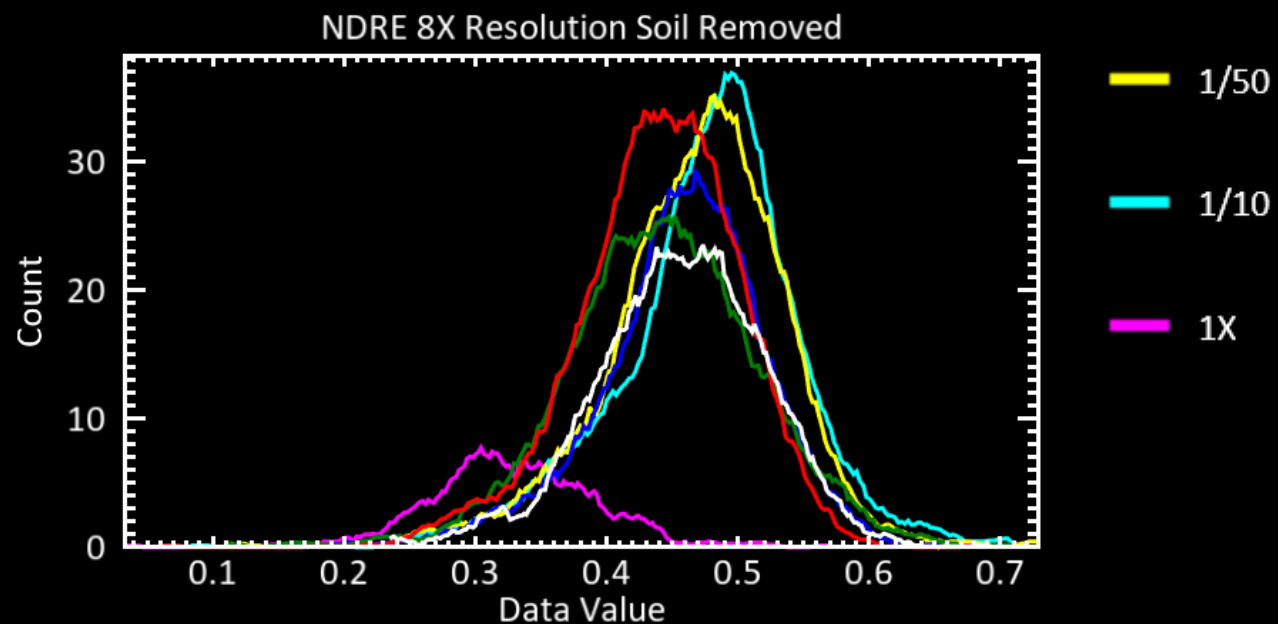
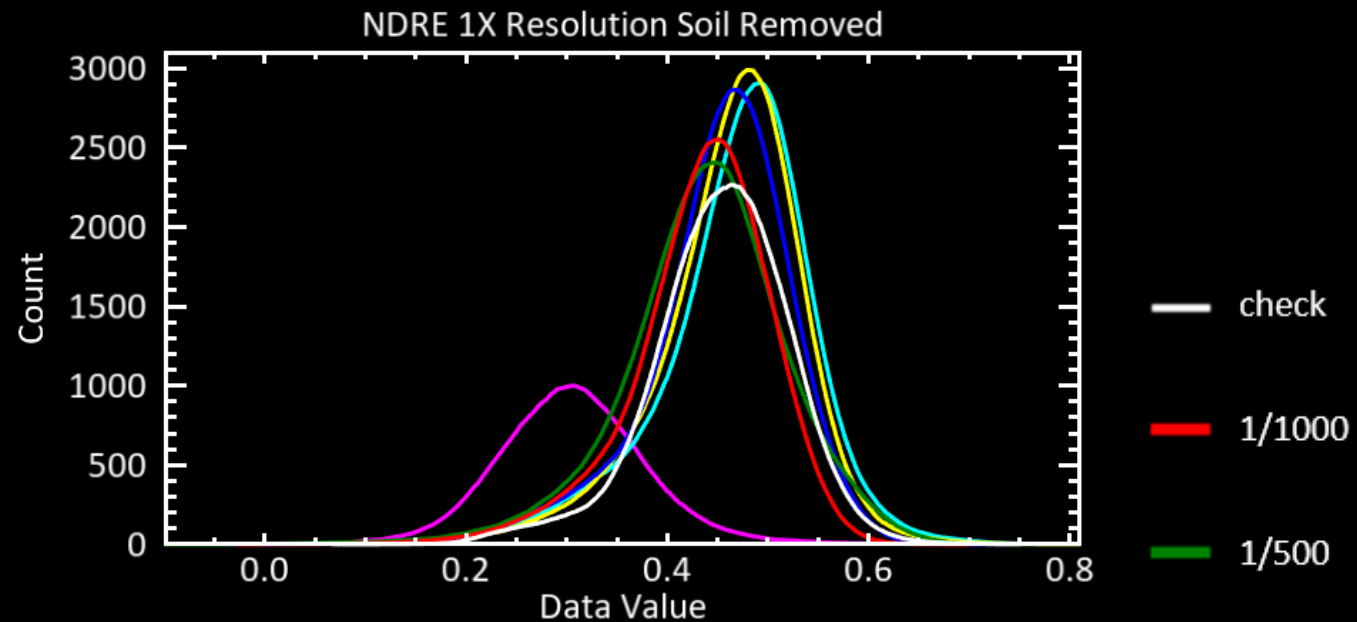
Herbicide Rate	Soil Included	Soil Removed
Untreated	0.7637 A	0.8672 A
1/1000X	0.7466 A	0.8570 A
1/500X	0.7438 A	0.8593 A
1/100X	0.7390 A	0.8541 A
1/50X	0.7726 A	0.8633 A
1/10X	0.7625 A	0.8617 A
1X	0.5032 B	0.7340 B



NDRE

Table 2. NDRE values at 1X and 8X resolution

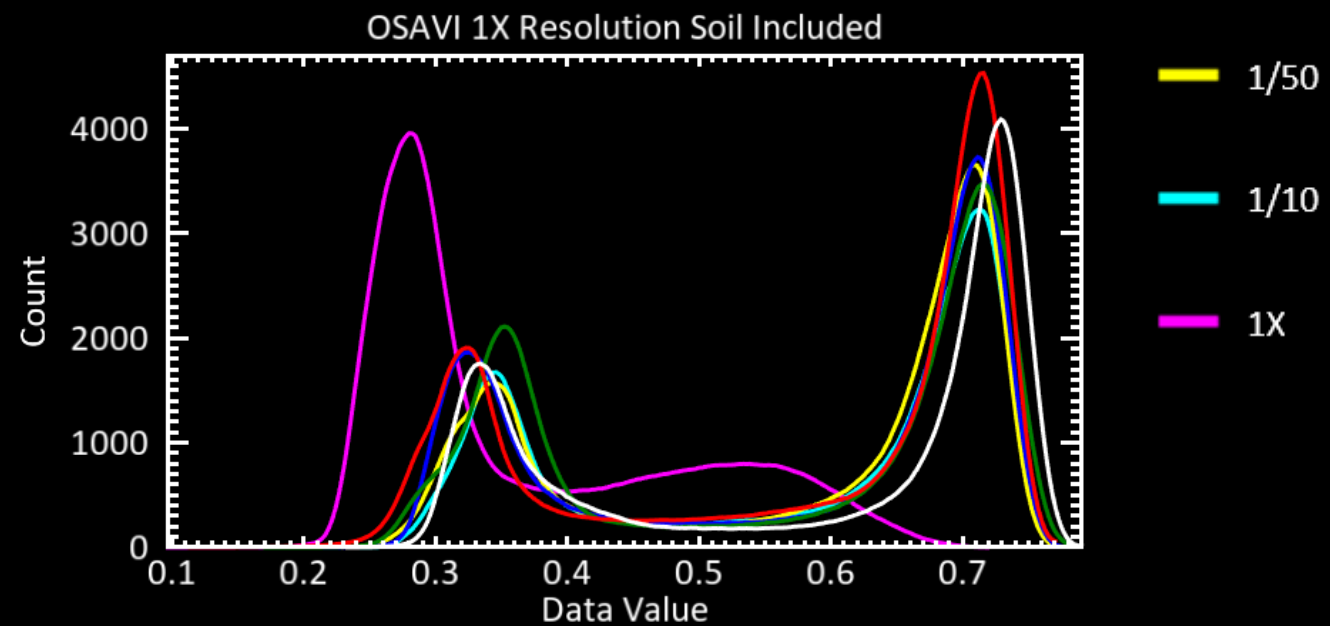
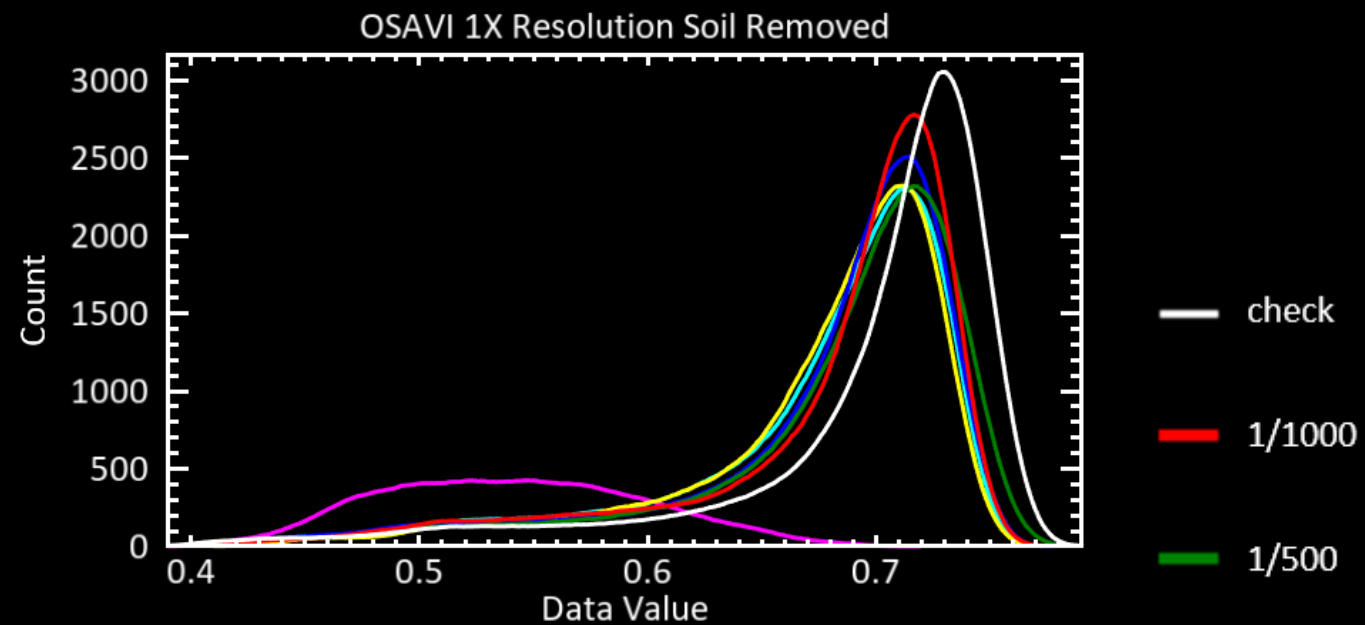
Spatial Resolution	Herbicide Rate	Soil Included	Soil Removed
1x	Untreated	0.3965 A	0.4527 ABC
	1/1000X	0.3742 A	0.4328 C
	1/500X	0.3723 A	0.4371 BC
	1/100X	0.3838 A	0.4506 ABC
	1/50X	0.4076 A	0.4619 AB
	1/10X	0.4098 A	0.4672 A
	1X	0.1913 B	0.3061 D
8x	Untreated	0.3883 A	0.4565 AB
	1/1000X	0.3722 A	0.4389 B
	1/500X	0.3618 A	0.4423 B
	1/100X	0.3796 A	0.4571 AB
	1/50X	0.4036 A	0.4690 A
	1/10X	0.4027 A	0.4773 A
	1X	0.1900 B	0.3292 C



OSAVI

Table 3. OSAVI values at 1X resolution

Herbicide Rate	Soil Included	Soil Removed
Untreated	0.5910 A	0.6964 A
1/1000X	0.5724 A	0.6788 B
1/500X	0.5648 A	0.6817 B
1/100X	0.5665 A	0.6758 B
1/50X	0.5771 A	0.6750 B
1/10X	0.5738 A	0.6728 B
1X	0.3678 B	0.5406 C

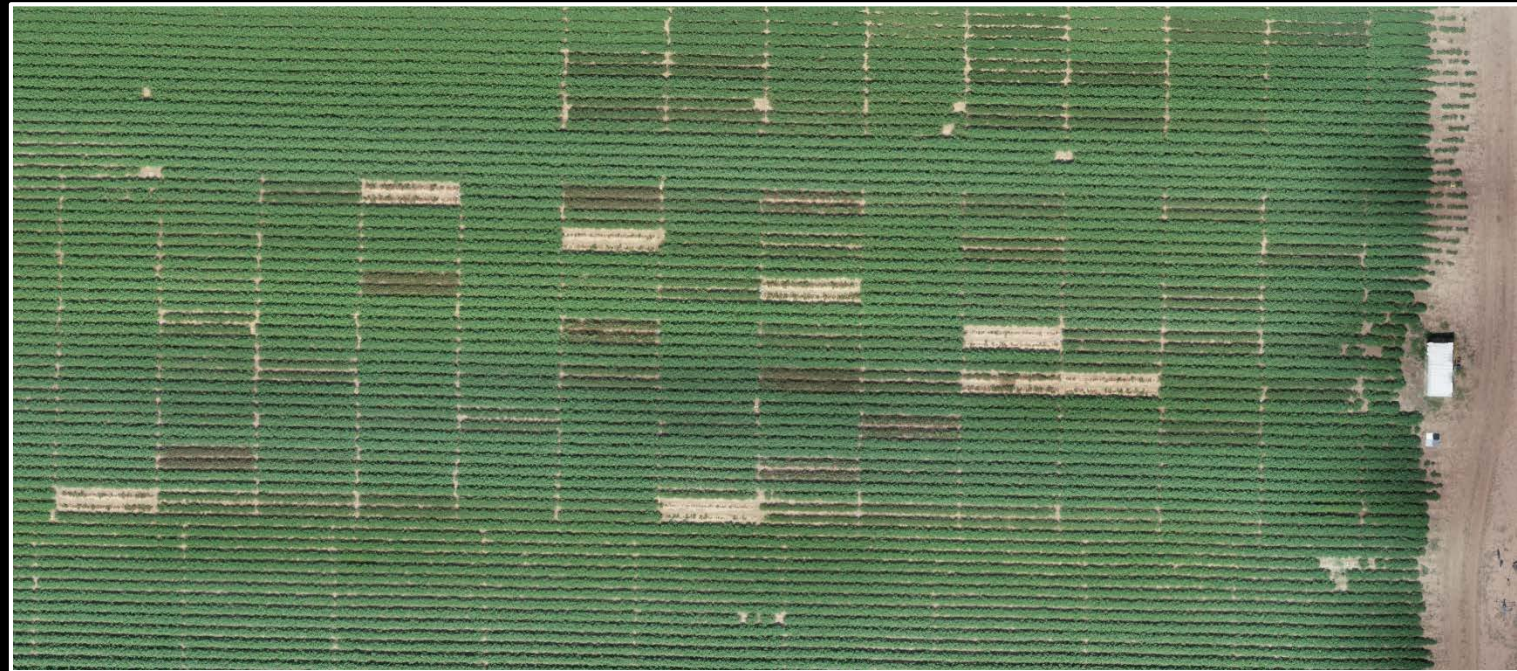


Summary

- The only difference using NDVI was observed from the 1X rate of 2,4-D.
- NDRE and OSAVI had greater treatment separation without the soil background across all spatial resolutions.
- All indices had similar results when the soil background was included in the analysis.
- Only difference in spatial resolution was observed at the lowest resolution using NDRE.

Future Research

- We plan to continue the analysis
 - Other vegetation indices
 - Different spatial resolutions
 - Different 2,4-D application timings



Thank You

- Texas Tech Weed Science team
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- Dr. Murilo Maeda
- Dr. Wenxuan Guo



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