2019 Nitrogen Use Efficiency Meeting
Columbia, MO

Challenges of Calibrating/Normalizing Digital Aerial Imagery

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Digital Aerial Imagery: Passive Sensor Systems

Remote sensing using passive sensor system
Normalization of Aerial Imagery

A) Raw Imagery

B) Normalized Imagery

Late-Season Imagery

Raw Data
Normalized or Enhanced

J. Precision Ag. 2012
## Idealized NDVI Values for Soybeans and Corn

<table>
<thead>
<tr>
<th>Age (Vegetative Stage)</th>
<th>Soybeans</th>
<th>Corn</th>
</tr>
</thead>
<tbody>
<tr>
<td>VE</td>
<td>0.3</td>
<td>0.4</td>
</tr>
<tr>
<td>V1</td>
<td>0.5</td>
<td>0.6</td>
</tr>
<tr>
<td>V2</td>
<td>0.7</td>
<td>0.7</td>
</tr>
<tr>
<td>V3</td>
<td>0.85</td>
<td>0.85</td>
</tr>
<tr>
<td>R1</td>
<td>0.6</td>
<td>0.4</td>
</tr>
<tr>
<td>R3</td>
<td>0.45</td>
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<td>R6</td>
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<tr>
<td>R7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R8</td>
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</tr>
</tbody>
</table>
Imagery Calibration Quality

- NDVI
- MAY 22
Imagery Calibration Project: 2015-2018

Study Site: Story County, Iowa

% Reflectance
3 6 12 33 44 56
Calibrated vs Uncalibrated Imagery

soybean

corn

Absolute/Calibrated NDVI

Relative/Uncalibrated NDVI

Jul 21

Worst

Average

Best
Temporal Series: Uncalibrated vs Calibrated

ISA Uncalibrated

ISA Calibrated

No Scale!

NDVI
Temporal Series: Uncalibrated vs Calibrated

ISA Uncalibrated

NDVI----No Scale!

ISA Calibrated NDVI
Temporal Trends in Uncalibrated NDVI Values

Temporal Comparison of Location Specific Crops: Uncalibrated NDVI Values

- Soybean 1
- Soybean 2
- Soybean Odd Early Season
- Soybean Sudden Death Syndrome
- Corn 1
- Corn 2

Date: Adjusted Relative Julian Date Starting at June 9, 2015
Temporal Trends in Calibrated NDVI Values

Temporal Comparison of Location Specific Crops: Calibrated NDVI Values

- Soybean 1
- Soybean 2
- Soybean Odd Early Season
- Soybean Sudden Death Syndrome
- Corn 1
- Corn 2

Date: Adjusted Relative Julian Date Starting at June 9, 2015
Imagery Calibration Equations

- Calibration equations for raw 16-bit imagery are more likely to be linear than 8-bit truncated.
Imagery Calibration Equations

![Graph showing calibration equations for soybean imagery with different tarps.]
Calibrated Imagery Use

2016 Temporal NDVI Values for Soybean Yield Zones

Absolute Calibrated NDVI

Relative Calibrated NDVI (parallel coordinate plots)
On-Line Dynamic Visual Imagery Tool

Index Time Series
Field Properties
Field ID
E3 (2017)
Crop
Corn
Vegetative Index
NDVI

Configuration
- Show average
- Show other crop season

Yield Category vs Calibrated NDVI

Past Year

Current Year

Corn Yield (bu/acre) 96.8 to 205 205 to 223 223 to 233 233 to 257

Corn Yield (bu/acre) 96.8 to 205 205 to 223 223 to 233 233 to 257
On-Line Dynamic Visual Imagery Tool
Peter,

Those calibration targets that you use at the test field... where did you get those from? Can you advise the manufacturer?

Thanks,
Questions ????

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