

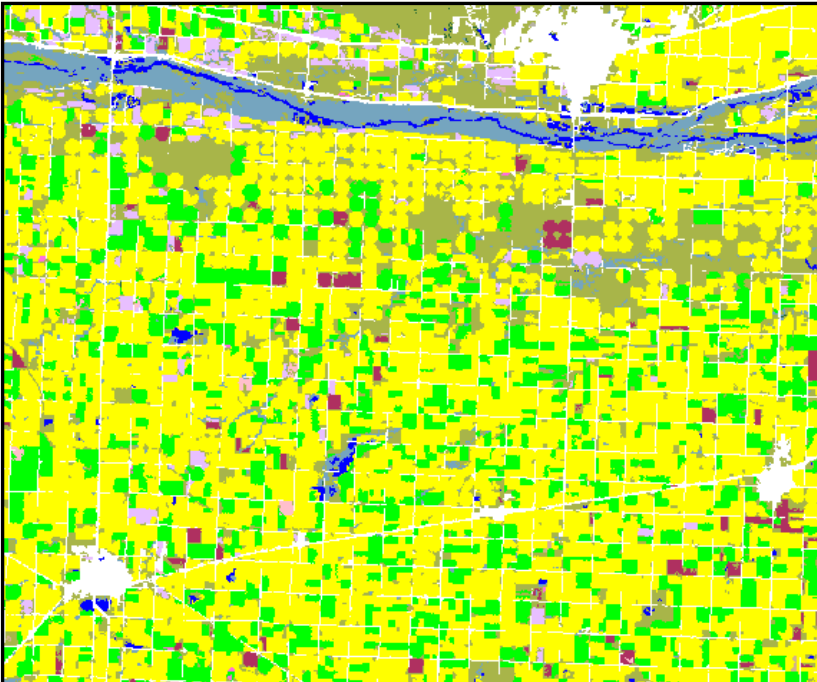
Essential Dates of AWiFS Data for the Identification of Corn and Soybean Fields in the U.S. Heartland

Claire Boryan
claire_boryan@nass.usda.gov
USDA/NASS

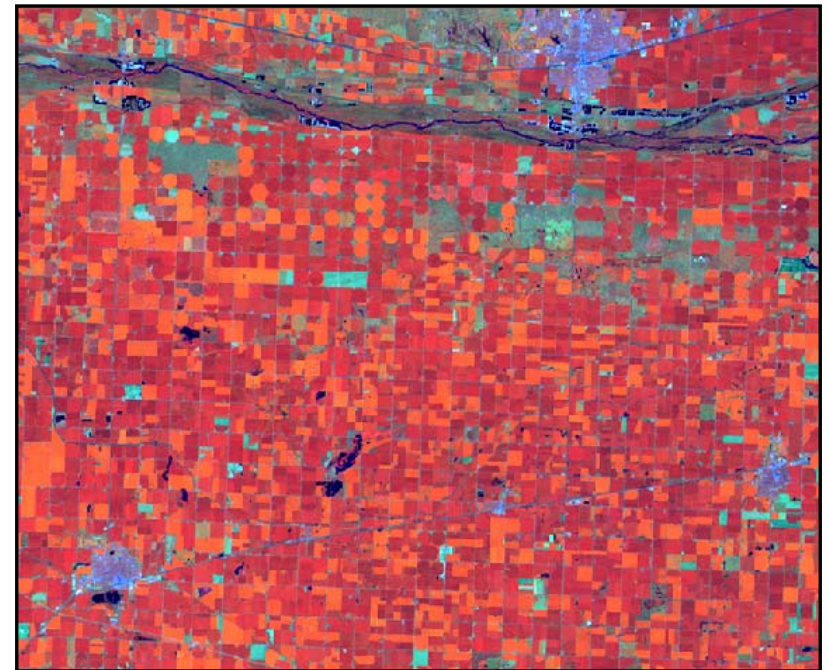


Cropland Data Layer (CDL)

- Refined state acreage estimates
- Improved county acreage estimates
- Image product available to the public



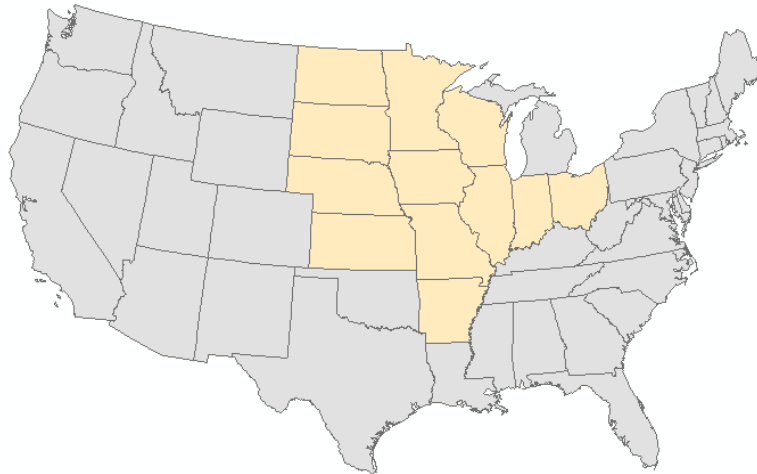
CDL Classification



Resourcesat-1 AWiFS, 13 August 2007

Goals of AWiFS Essential Dates Assessment

- To determine the necessary dates of AWiFS data for the identification of corn and soybean fields in the U.S. Heartland.

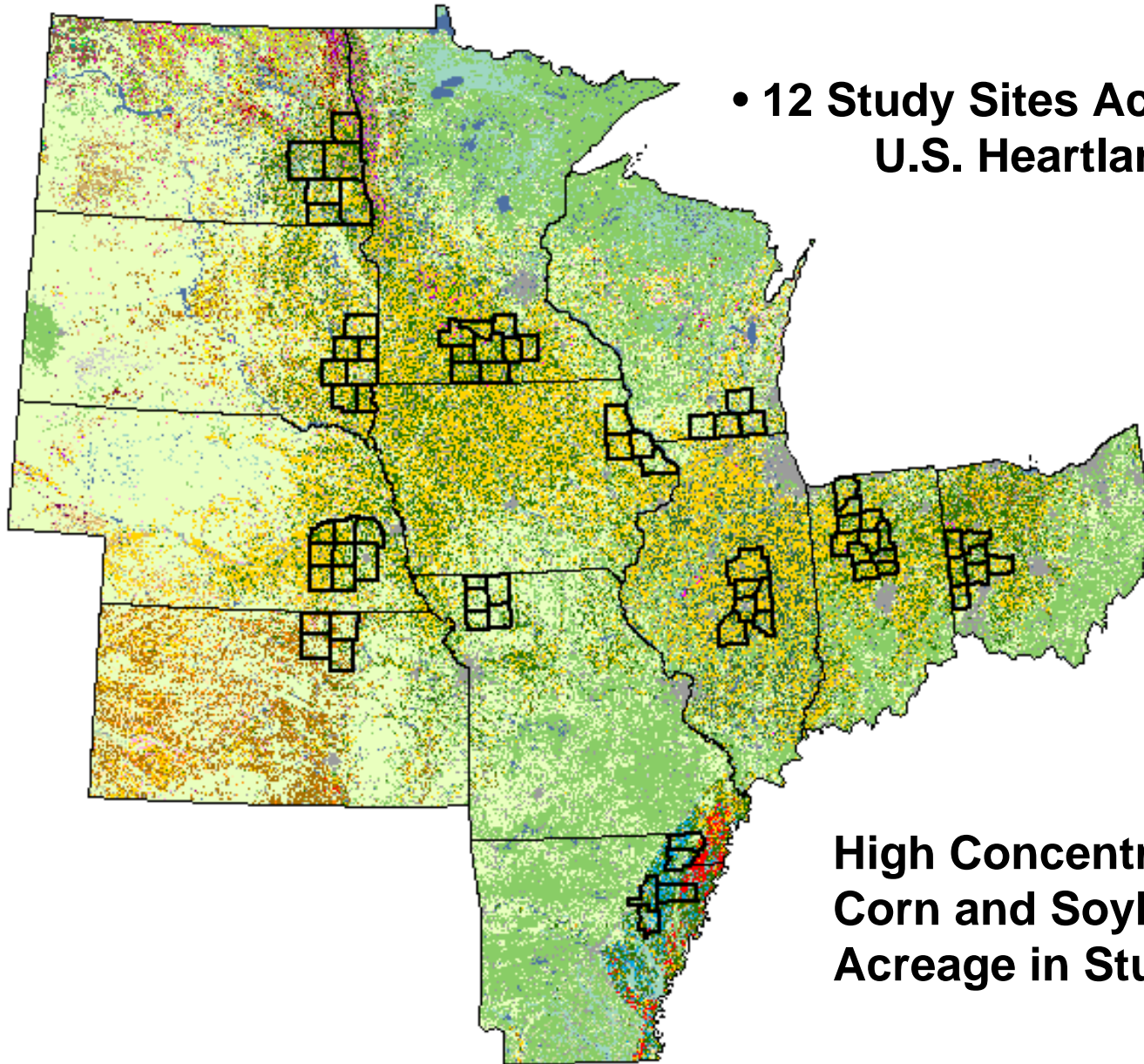


Corn



Soybeans

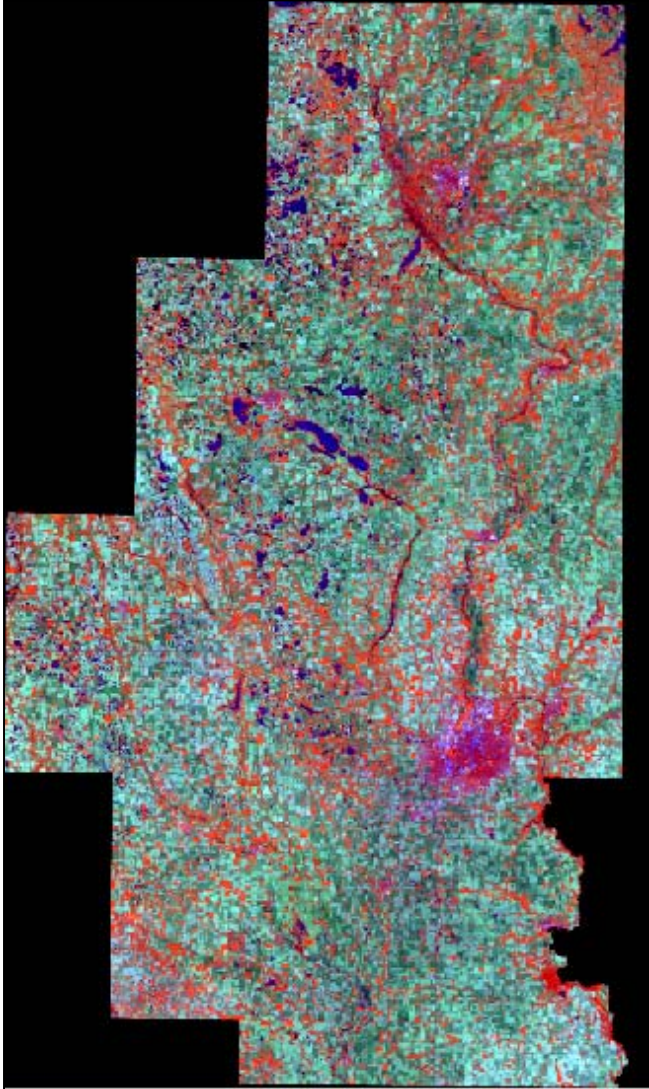
Methodology



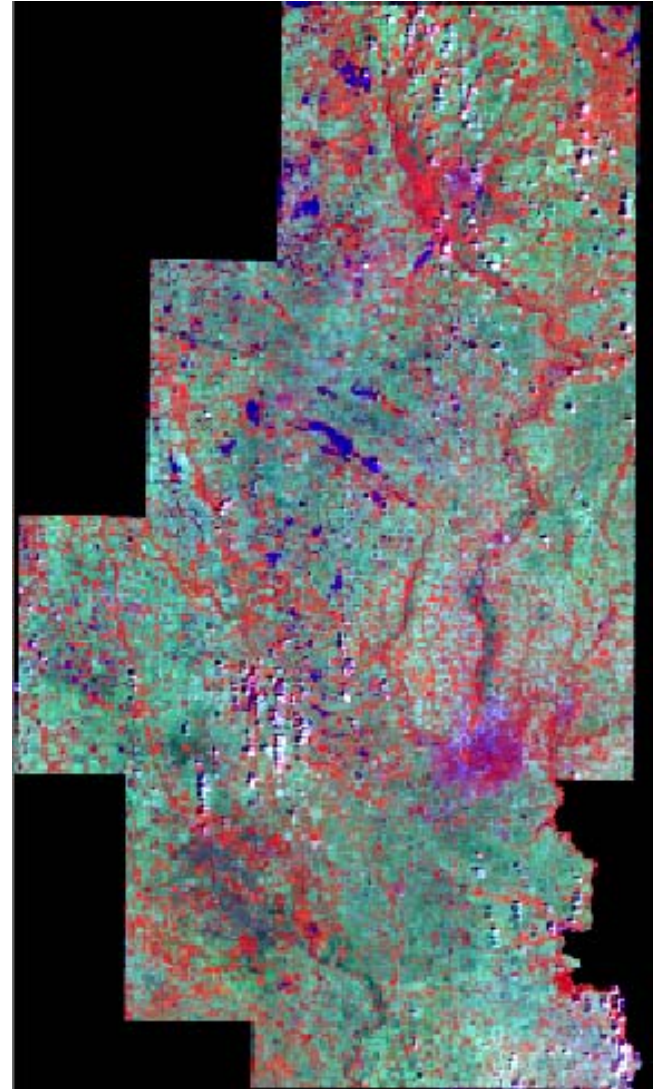
- 12 Study Sites Across the U.S. Heartland

High Concentration of Corn and Soybean Acreage in Study Sites

AWiFS Imagery Time Series (South Dakota Study Site)

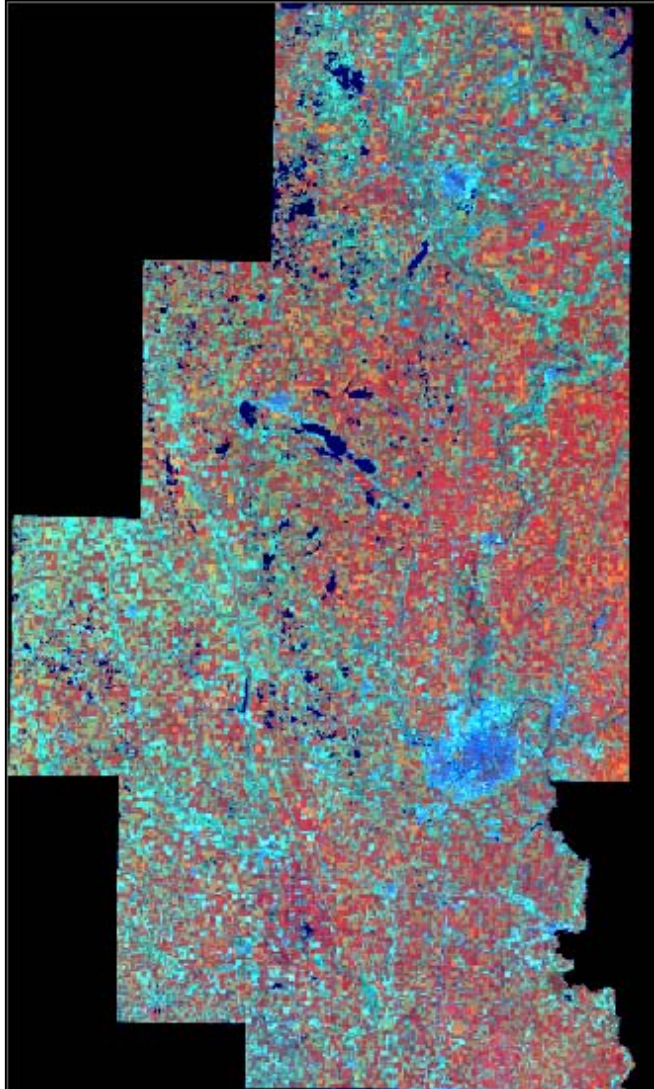


May 18

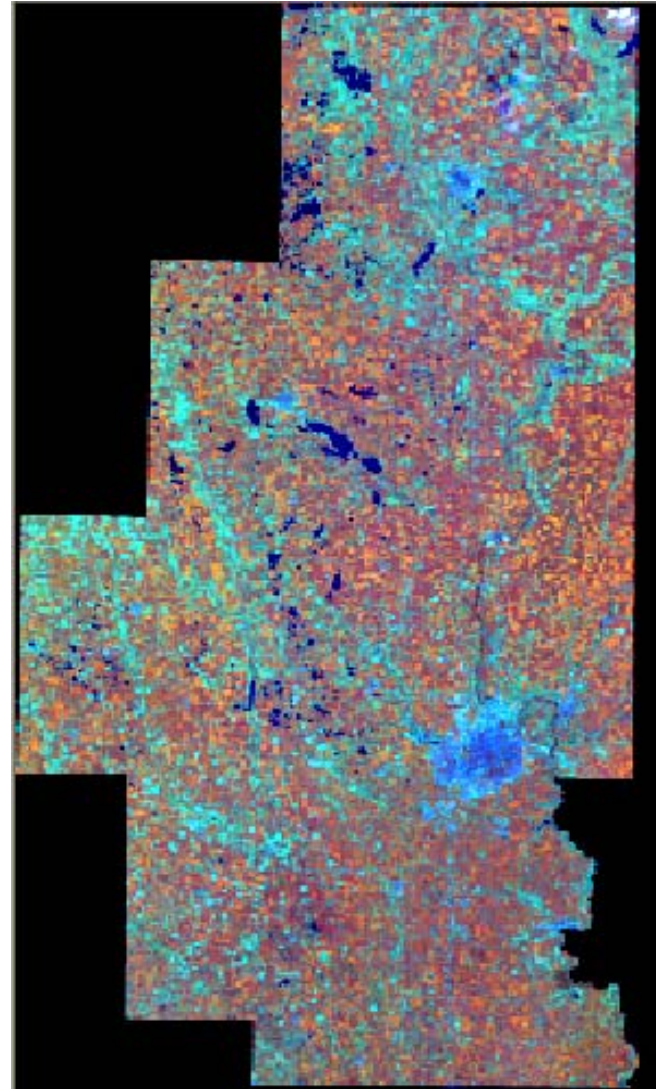


June 11

AWiFS Imagery Time Series (South Dakota Study Site)

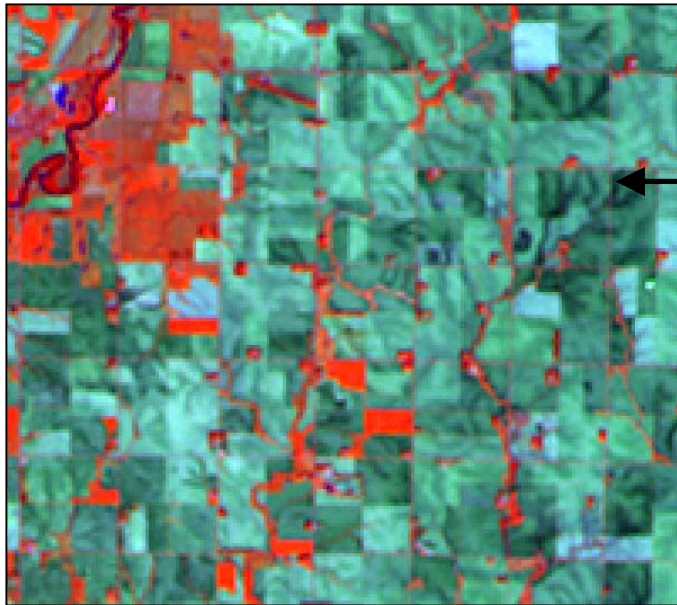


July 20

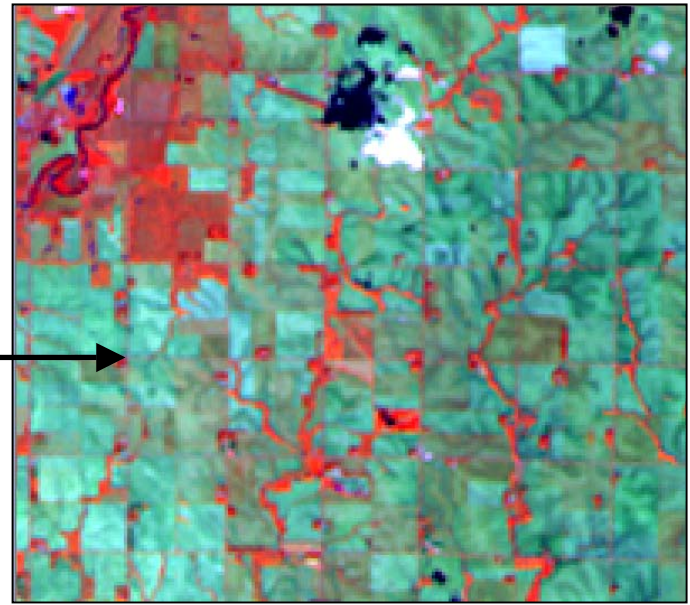


Aug 13

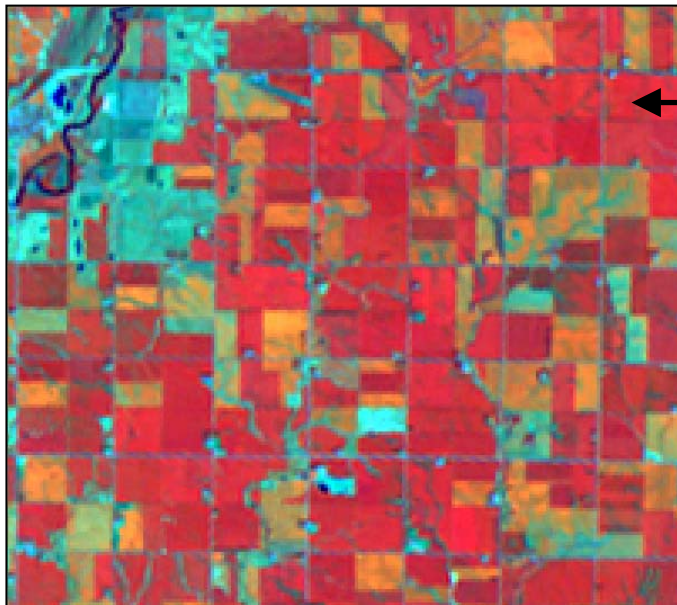
AWiFS Imagery Time Series



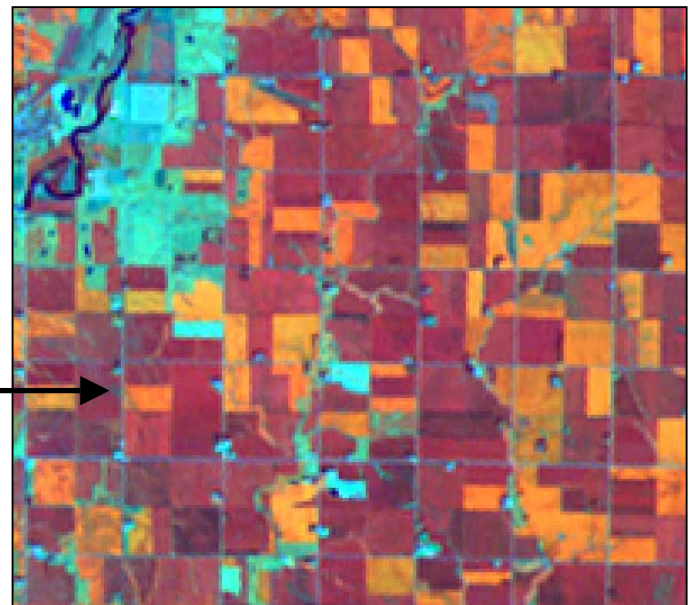
← May 28



June 11 →



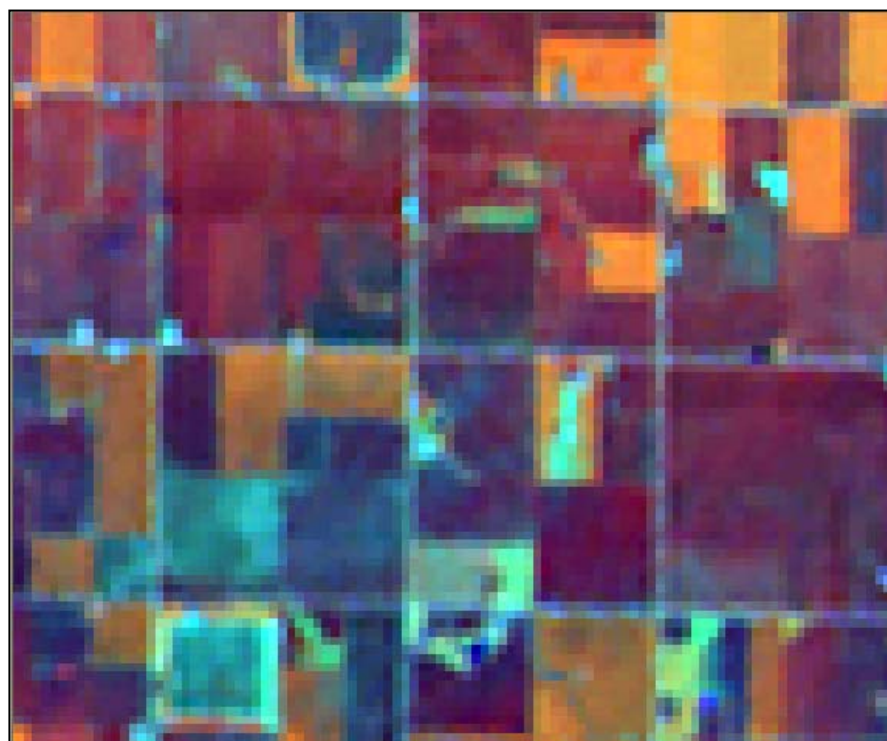
← July 20



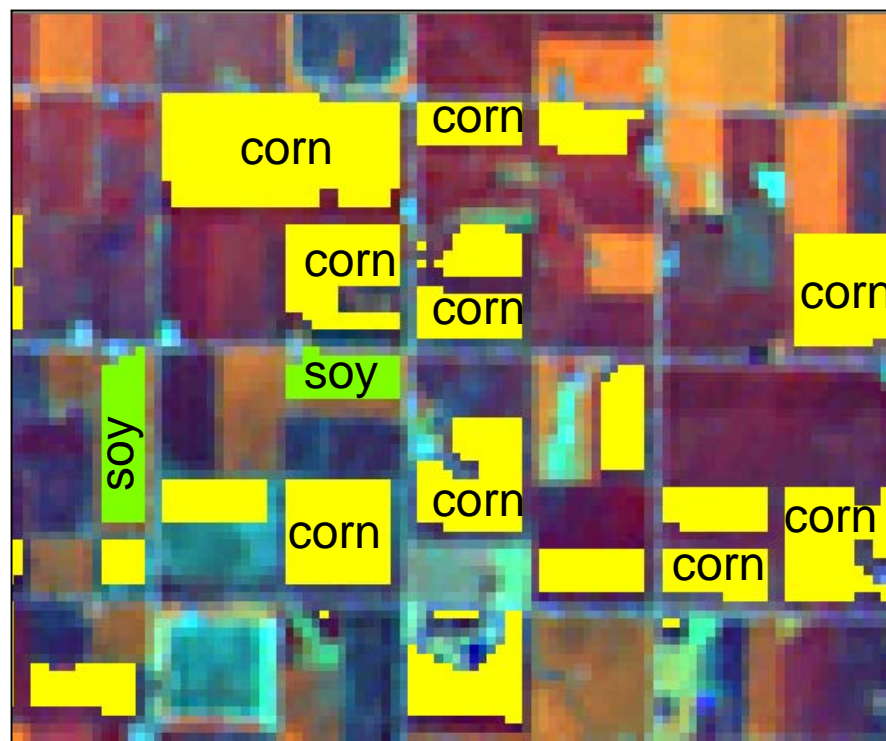
Aug 13 →

Ground Truth - Agriculture

Farm Service Agency (FSA)
- Common Land Unit (CLU) 578
reporting data



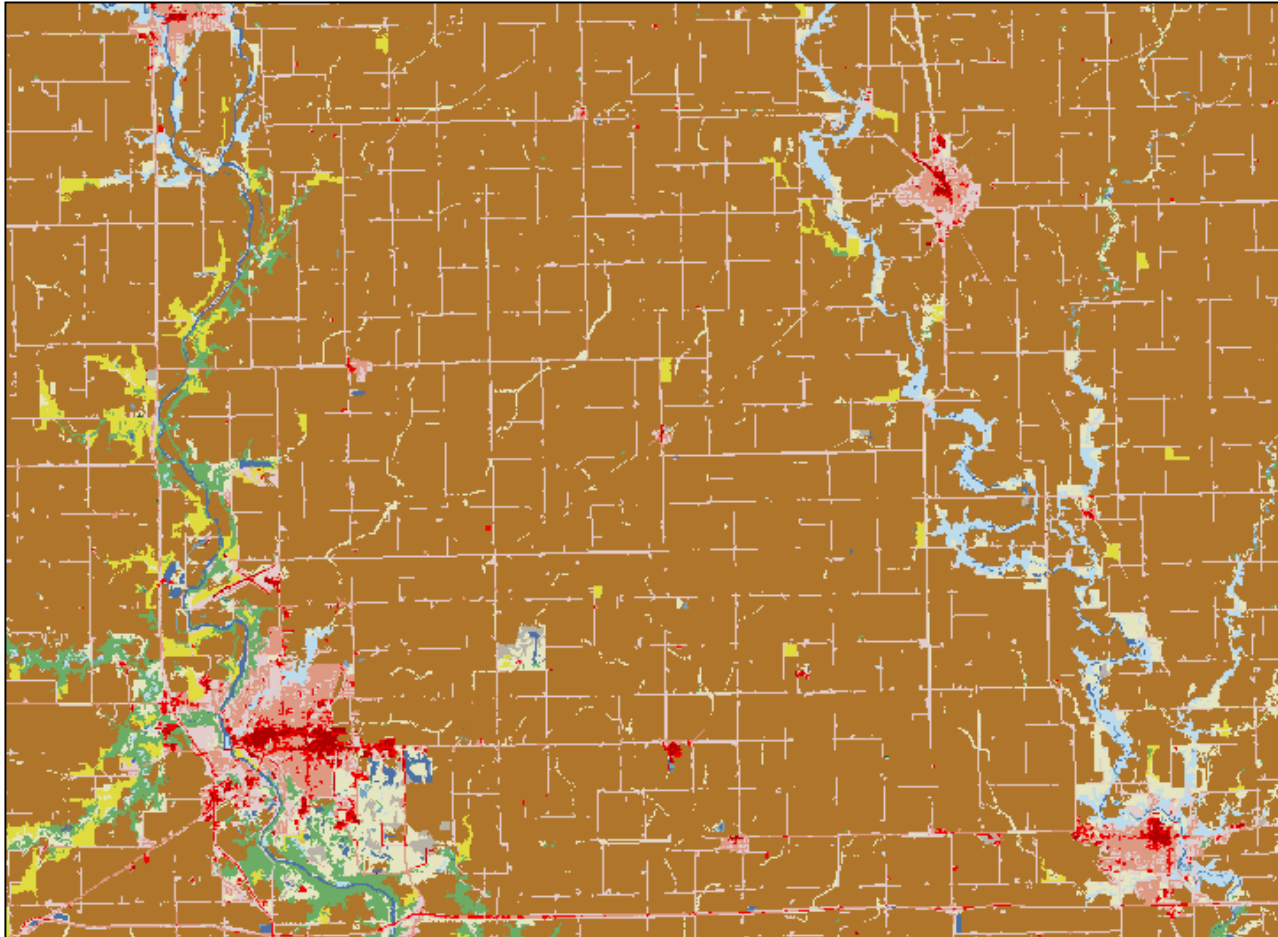
AWiFS Scene- 8/27/07



FSA CLU Polygons on AWiFS

Ground Truth – Non Agriculture

2001 National Land Cover Dataset



Methodology

- **Identical Methodologies using ERDAS Imagine and See5 Decision Tree Software**
- **Seven Classifications (per study site) vary only by the dates of AWiFS data used**
 - 4 dates- May, June, July, August
 - 3 dates- May, June, July
 - 2 dates- May, June
 - 1 date - May
 - 1 date - June
 - 1 date - July
 - 1 date - August

Nebraska Study Site

Polk, York, Fillmore, Butler, Seward, Saline, Saunders, Lancaster Counties



Soybeans



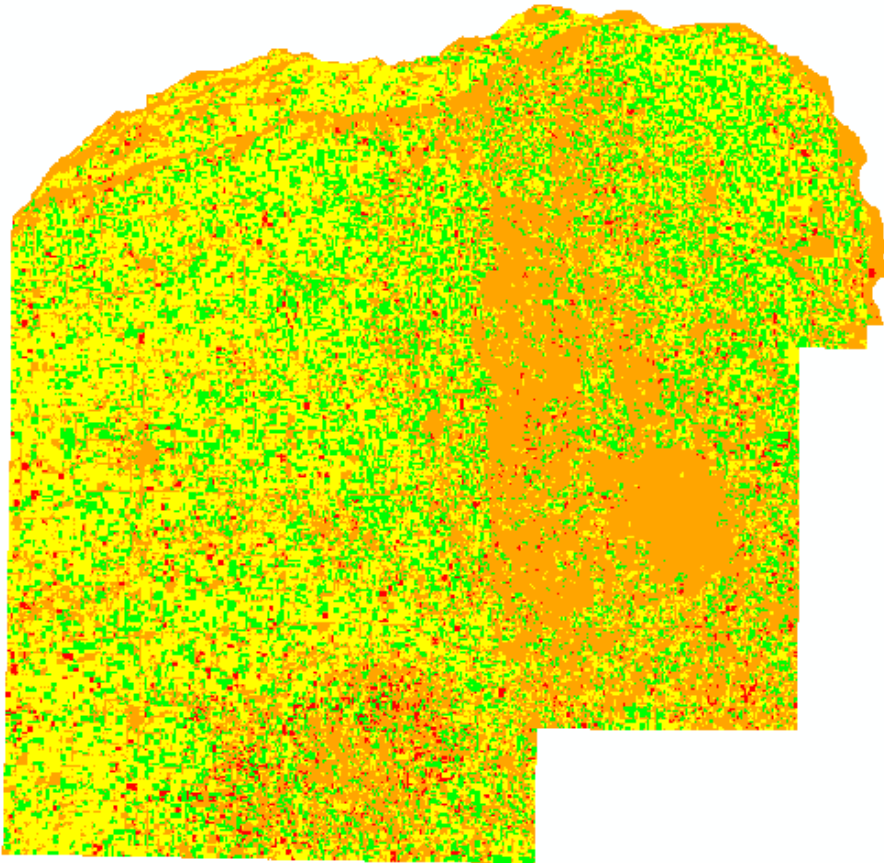
Corn



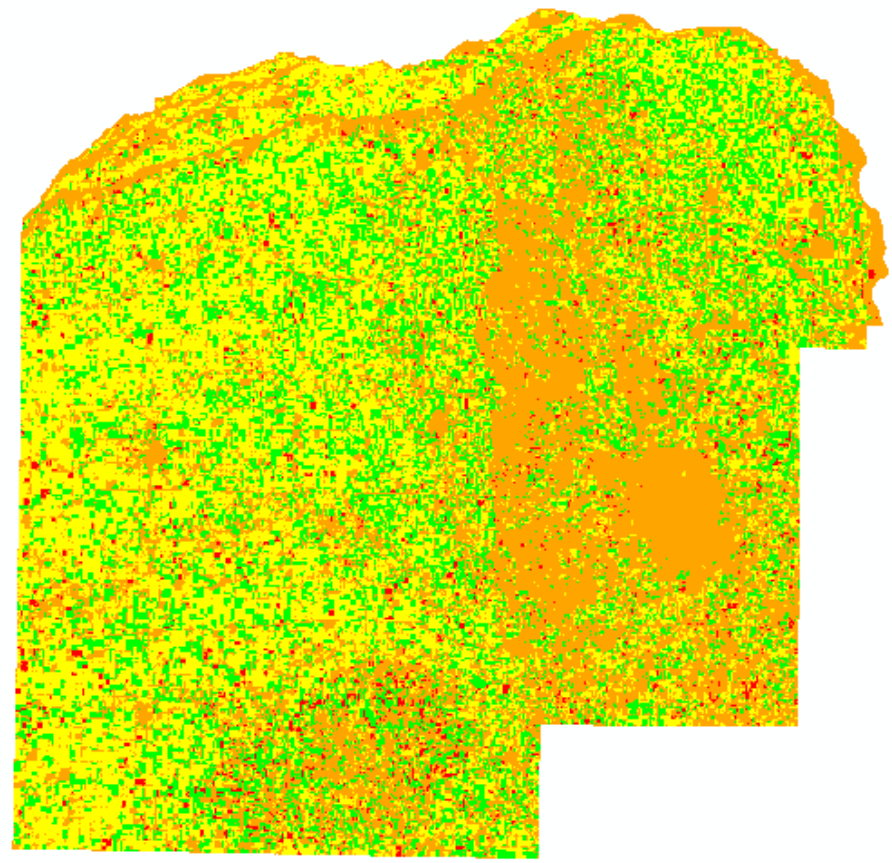
Other Crop



Non Agriculture



4 dates – 5/18, 6/07, 7/06, 8/27 AWiFS



3 dates – 5/18, 6/07, 7/06 AWiFS

Nebraska Study Site

Polk, York, Fillmore, Butler, Seward, Saline, Saunders, Lancaster Counties



Soybeans



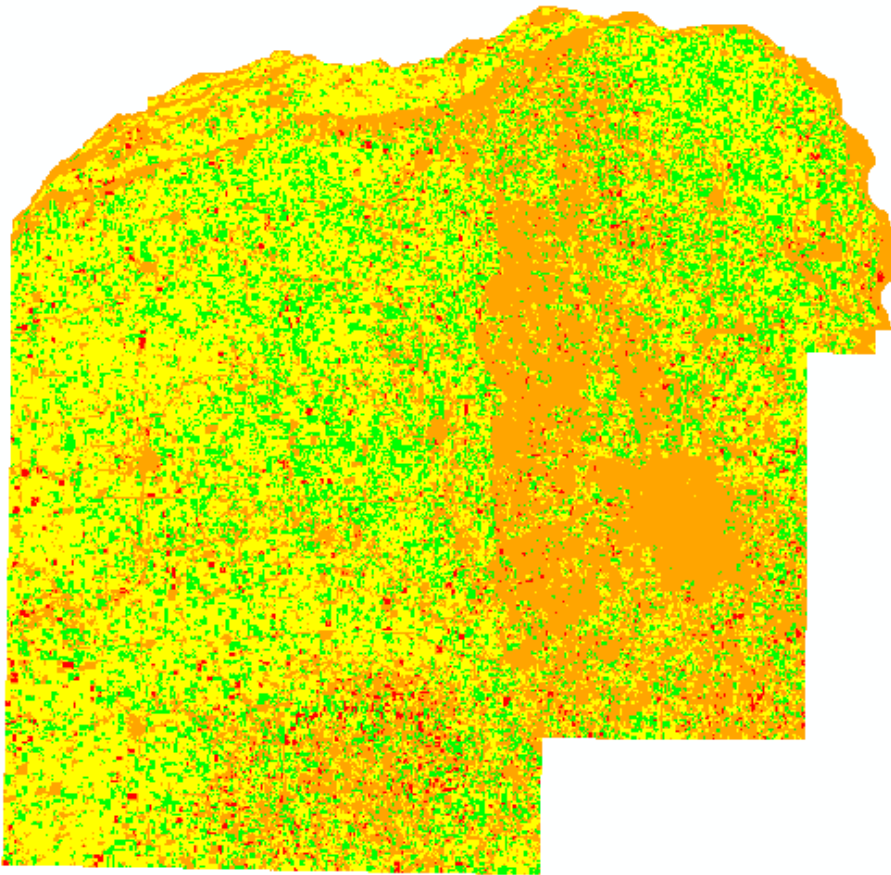
Corn



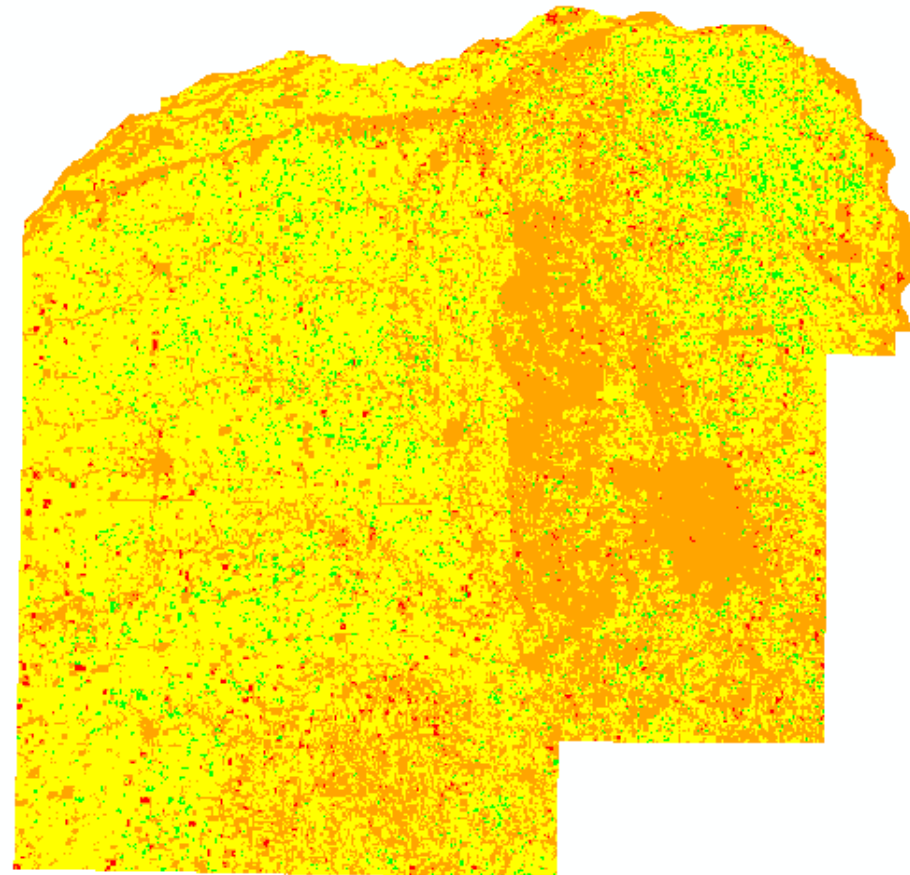
Other Crop



Non Agriculture



2 dates – 5/18, 6/07 AWiFS



1 date – 5/18 AWiFS

Close-up of Nebraska Study Site



Soybeans



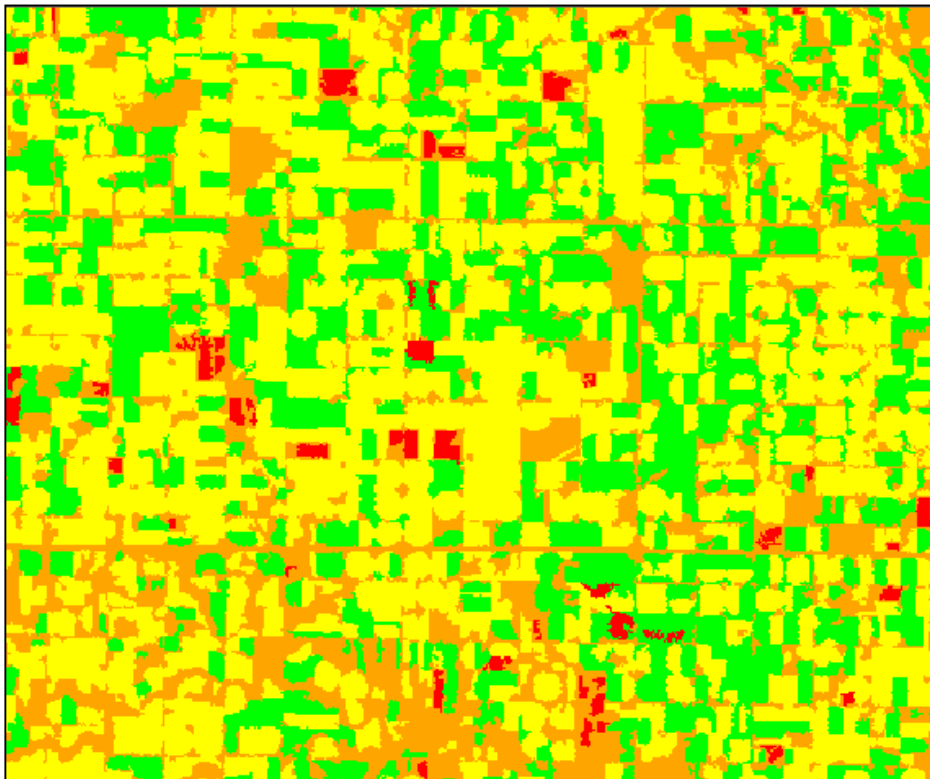
Corn



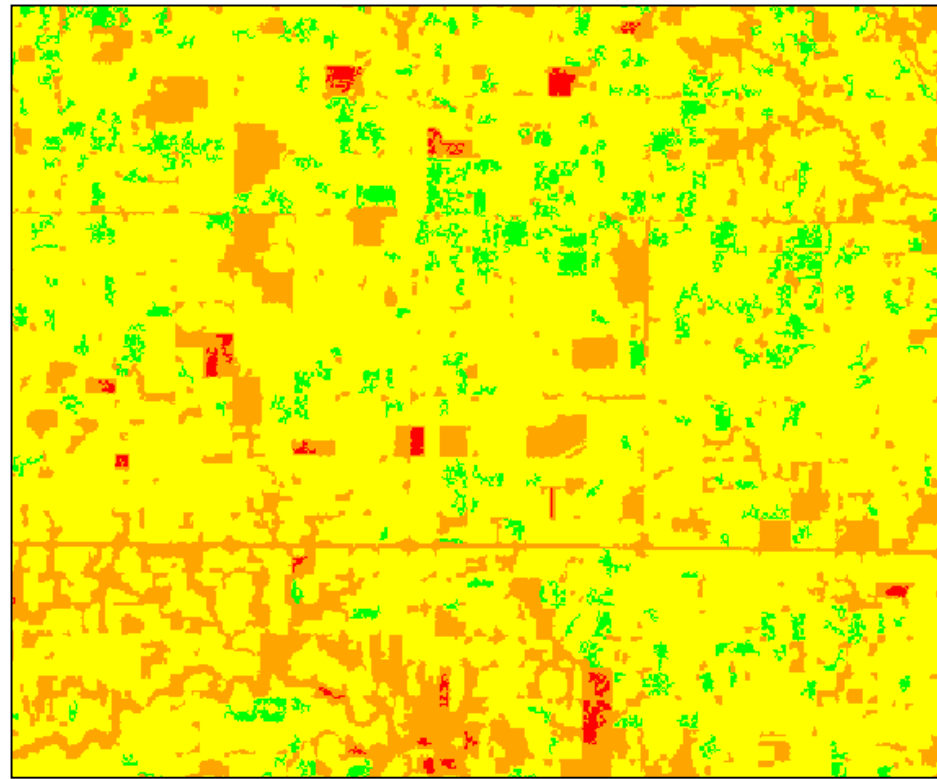
Other Crop



Non AG



4 dates – 5/18, 6/07, 7/06, 8/27 AWiFS



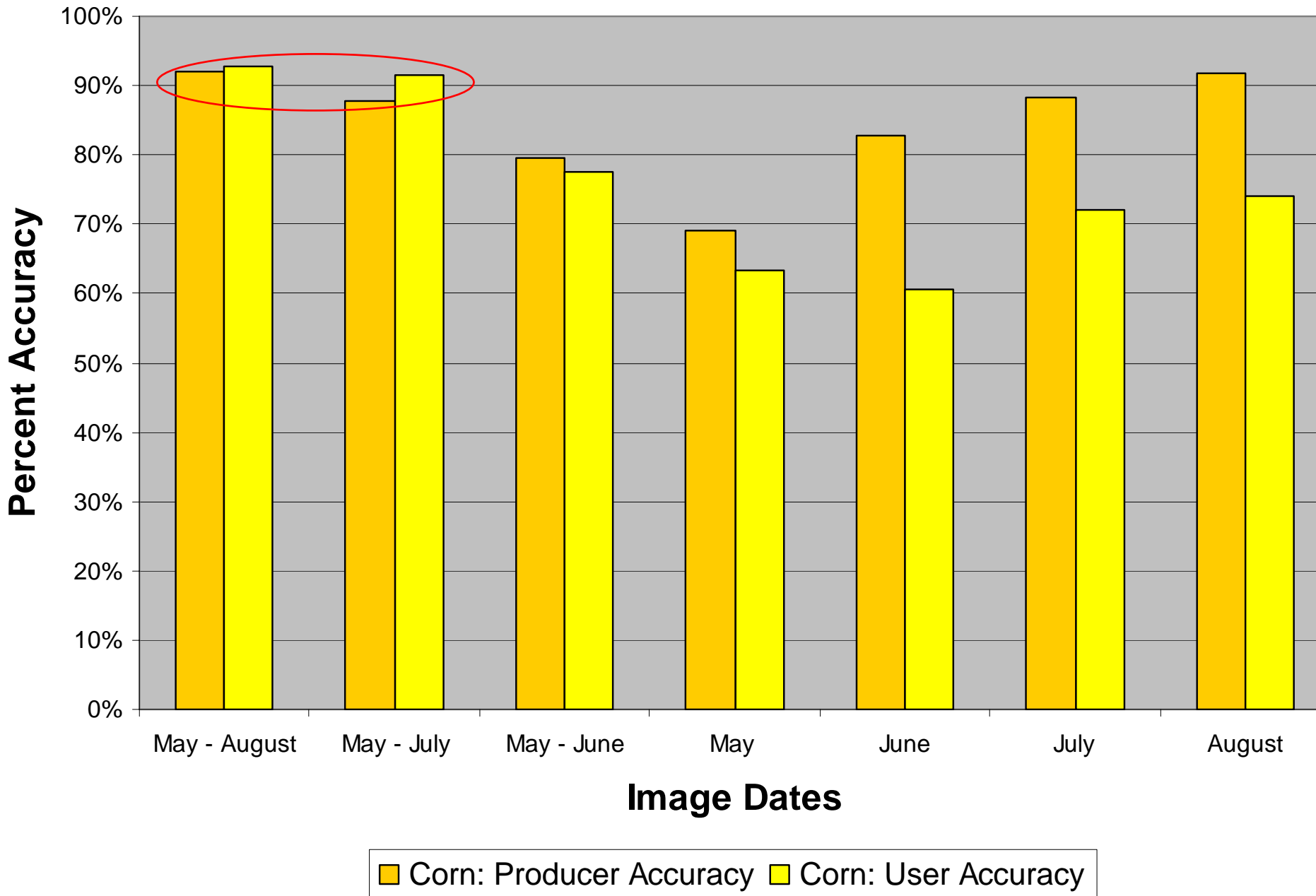
1 date – 5/18 AWiFS

Accuracy Measures

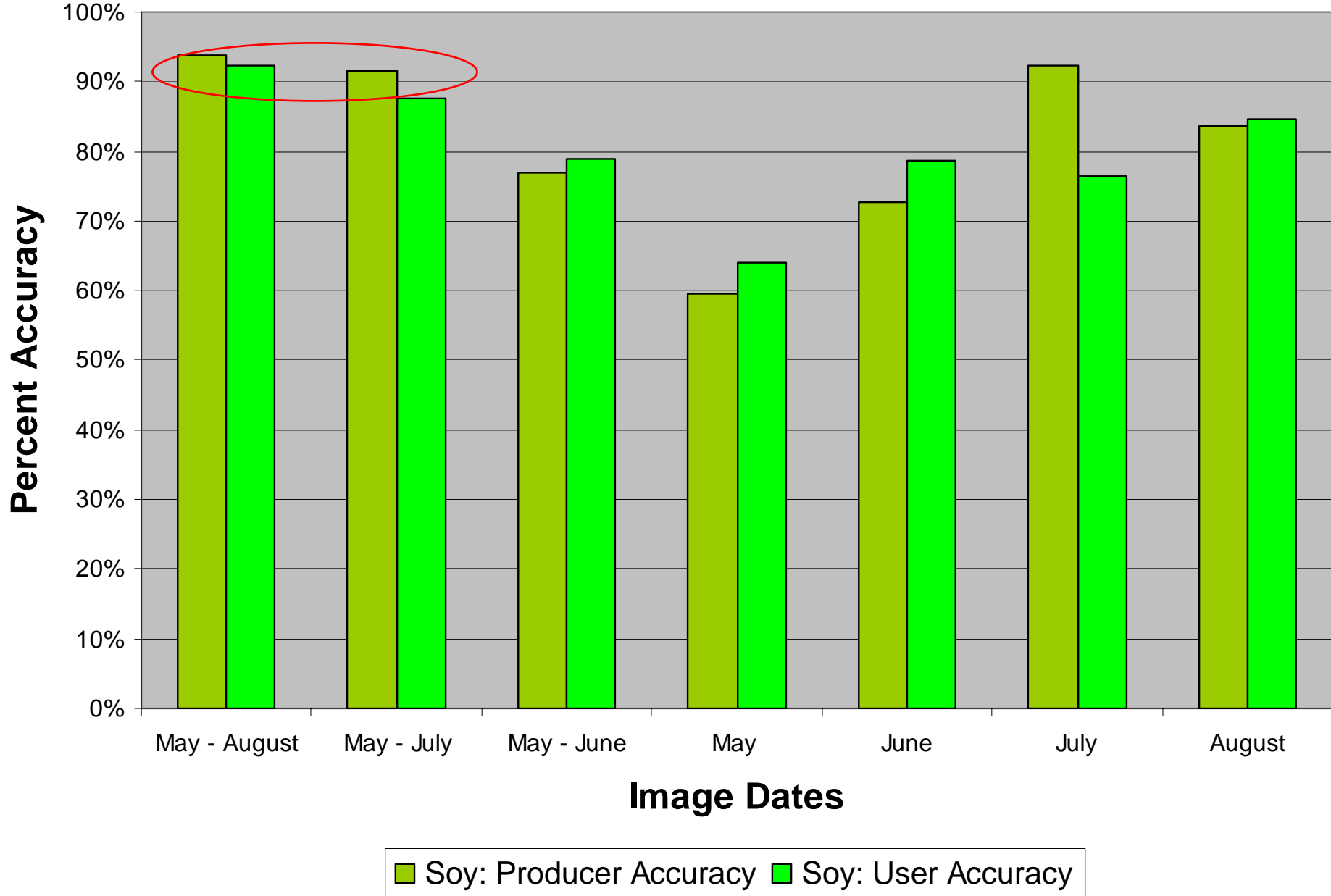


- **User's Accuracy:** indicates the probability that a pixel from the classification actually matches the ground truth data and measures errors of commission
- **Errors of Commission:** occur when a pixel is included in an incorrect category
- **Producer's Accuracy:** relates to the probability that a ground truth pixel will be correctly mapped and measures errors of omission.
- **Errors of Omission:** occur when a pixel is excluded from the correct category

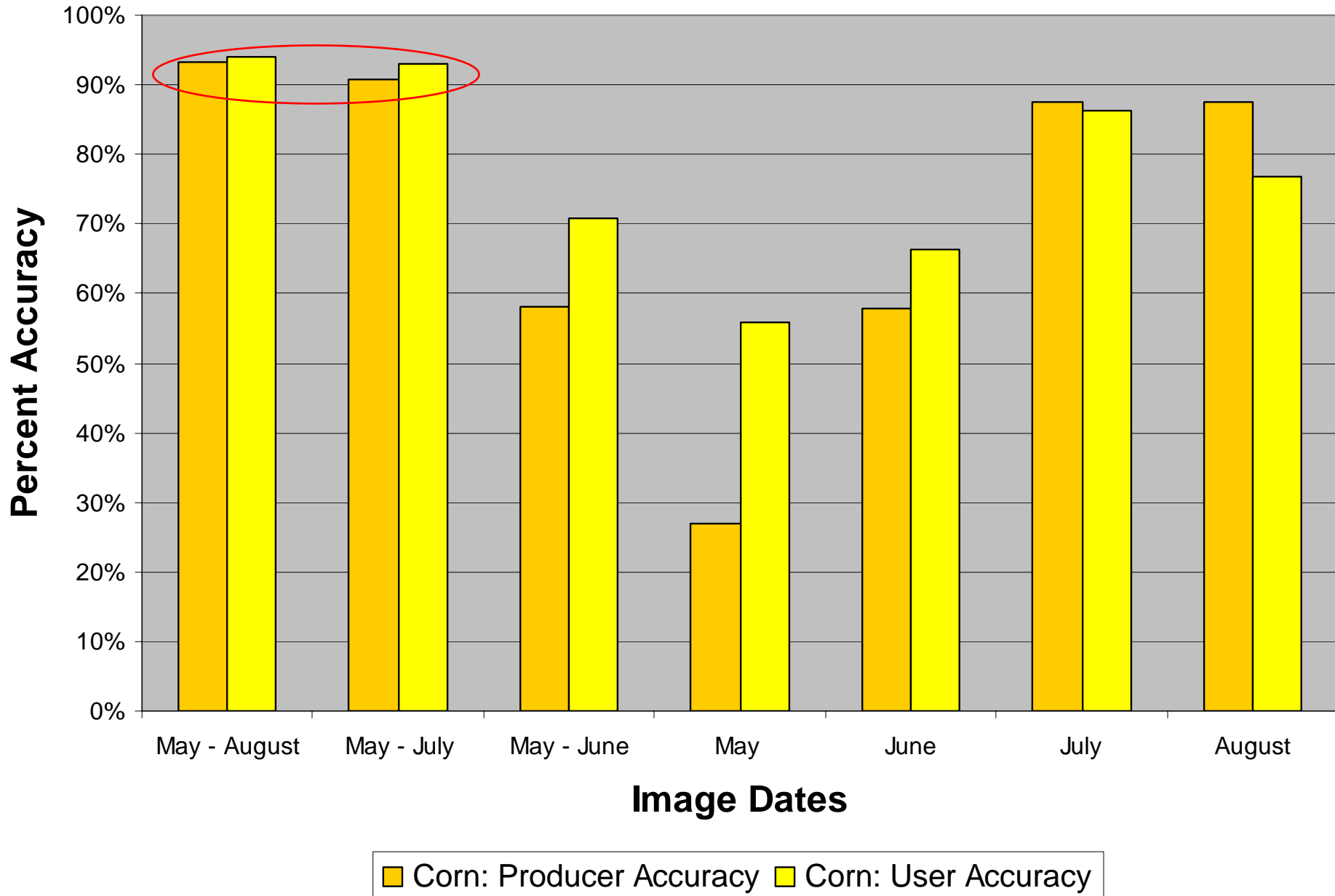
Ohio: Corn Accuracy



Ohio: Soybean Accuracy



North Dakota: Corn Accuracy

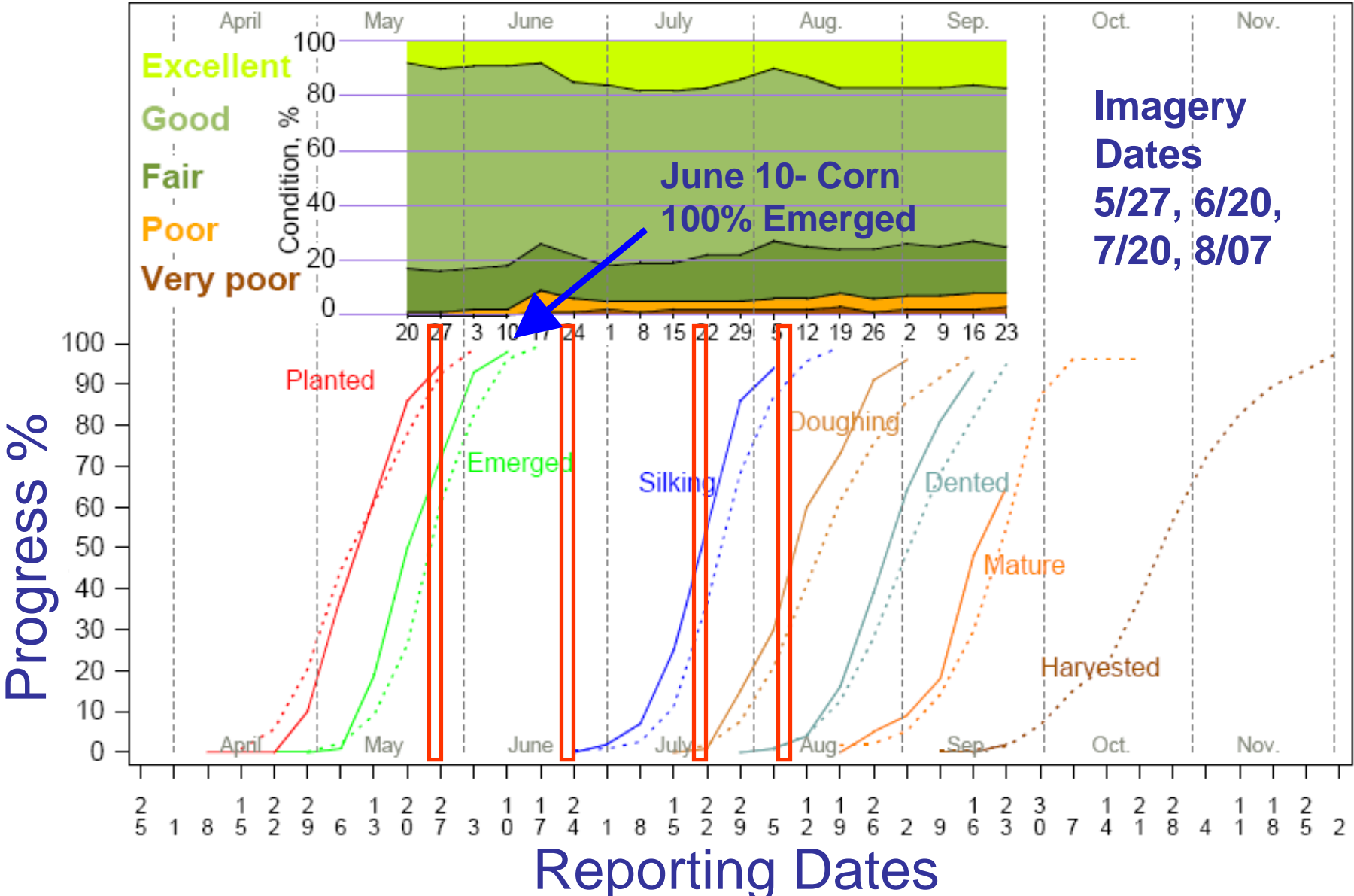




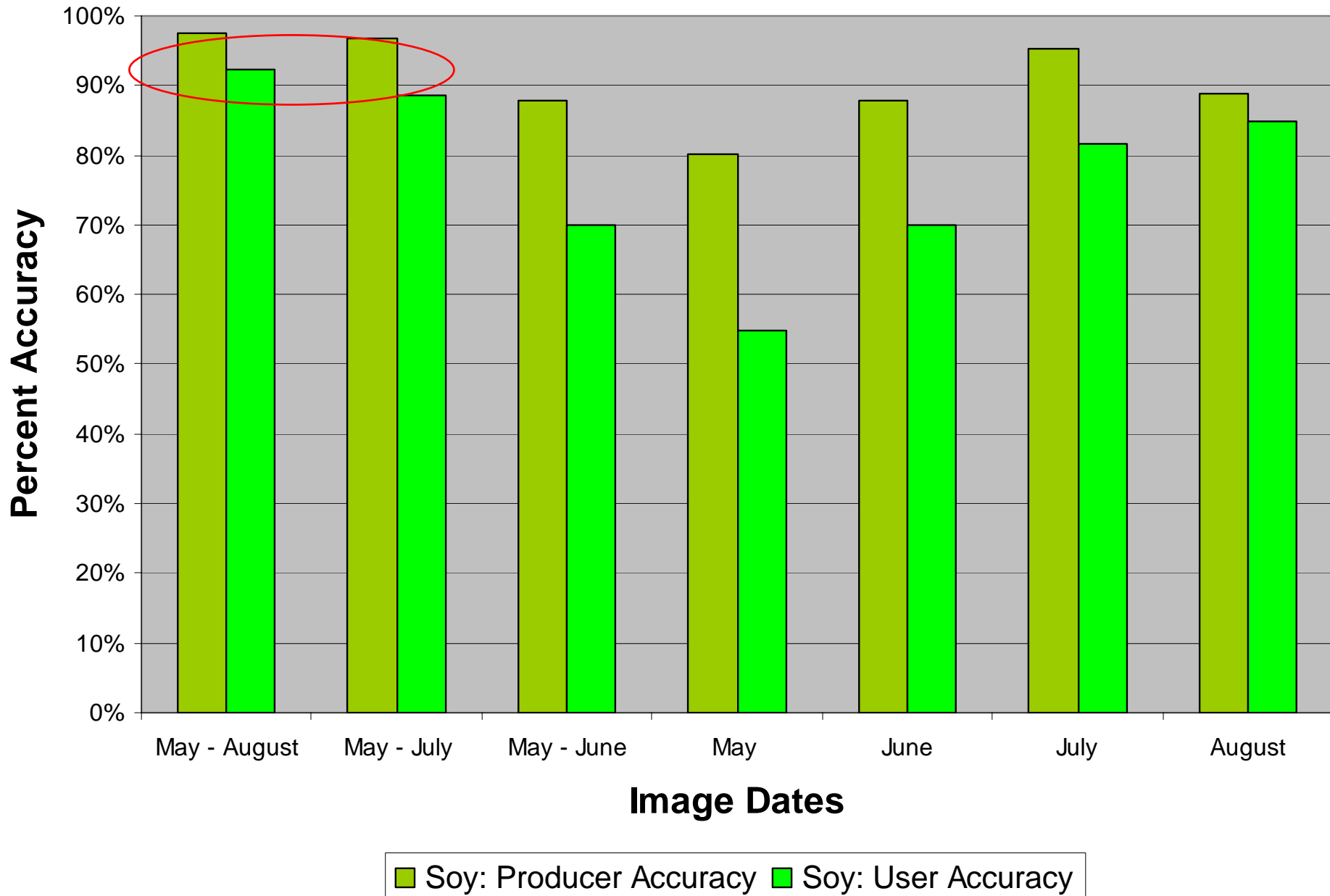
Crop Progress: Corn in North Dakota



_____ 2007, - - - - - 2002-2006 Average



North Dakota: Soybean Accuracy

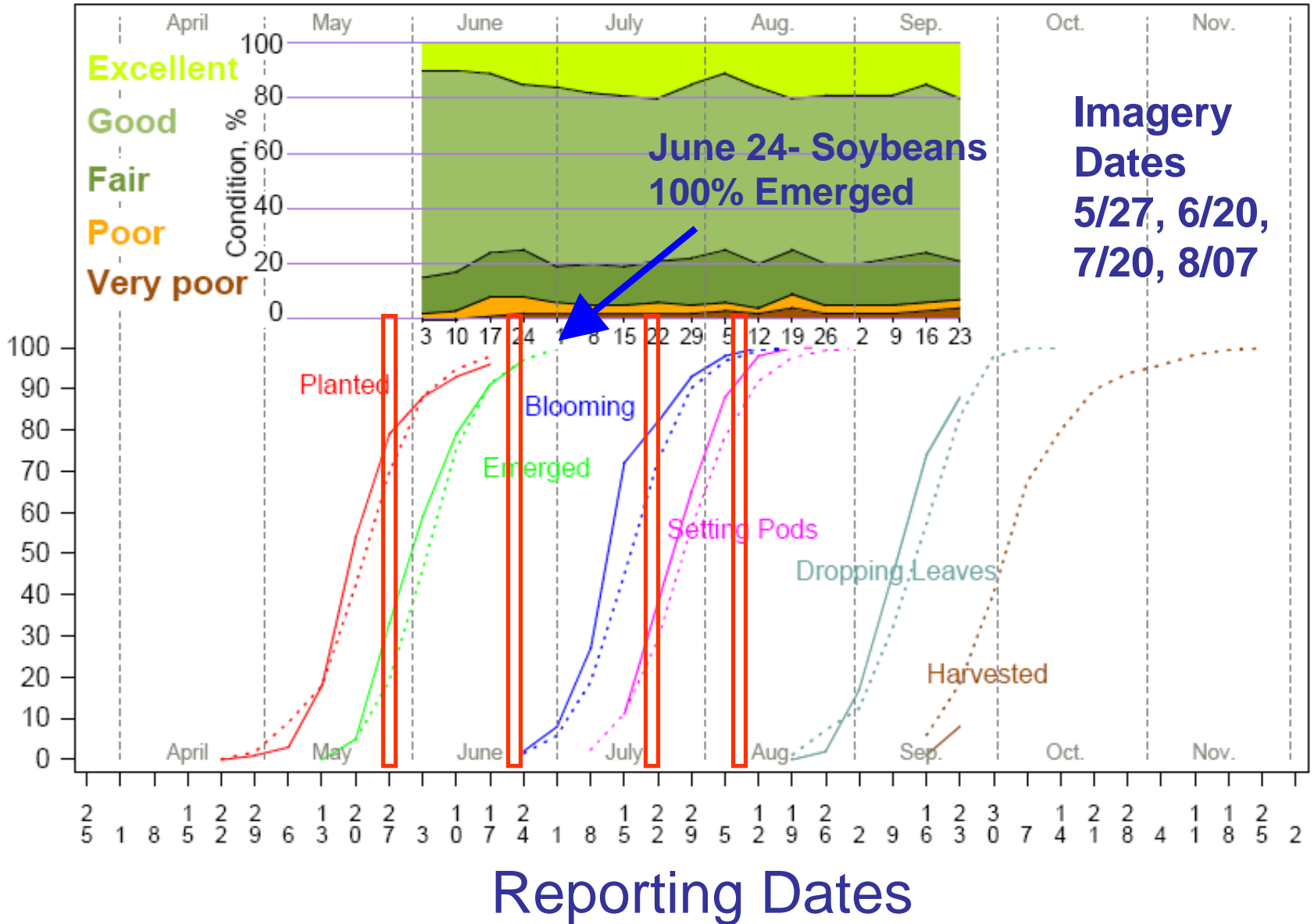




Crop Progress: Soybeans in North Dakota

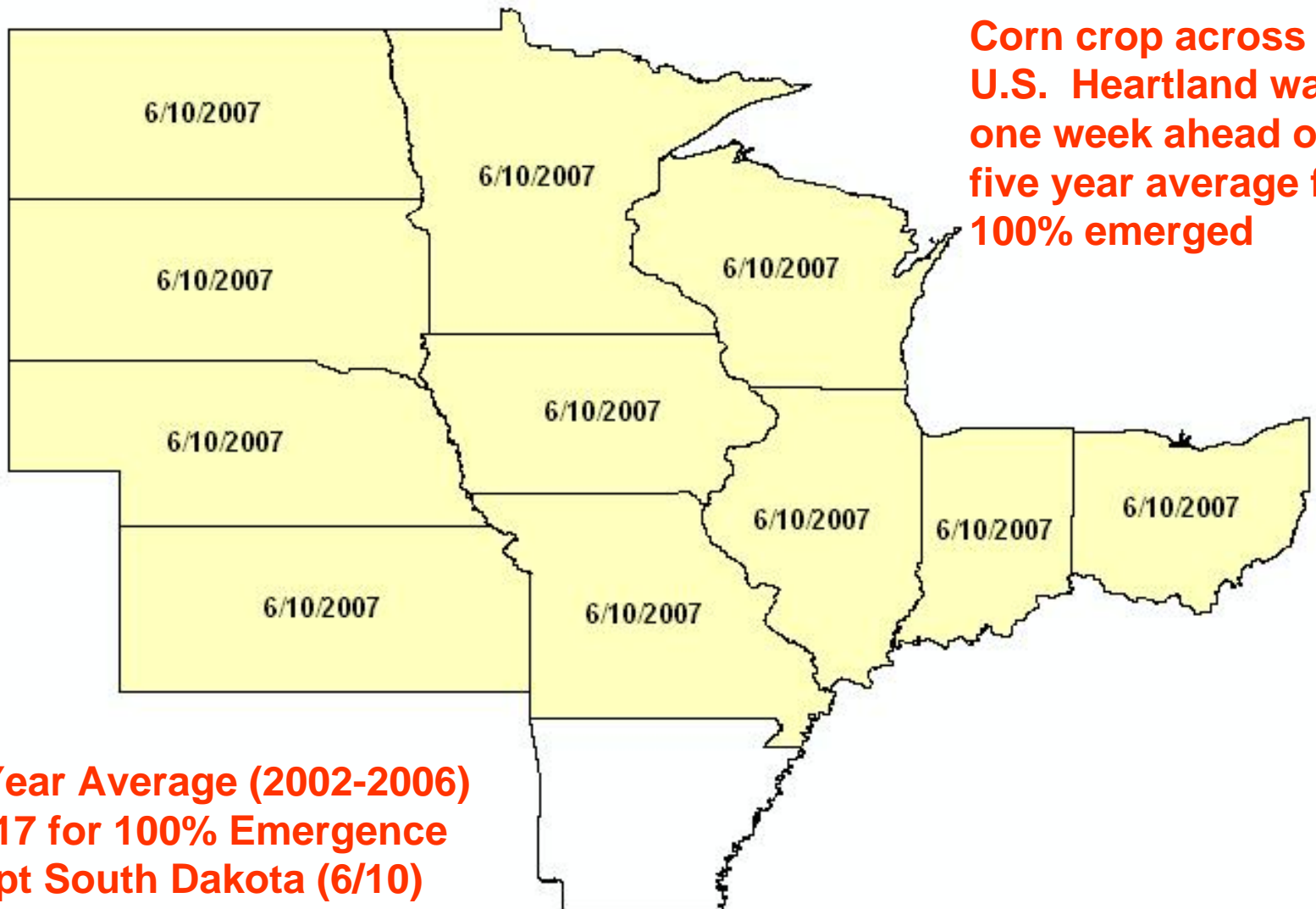


_____ 2007, - - - - 2002-2006 Average



Corn Across the U.S. Heartland

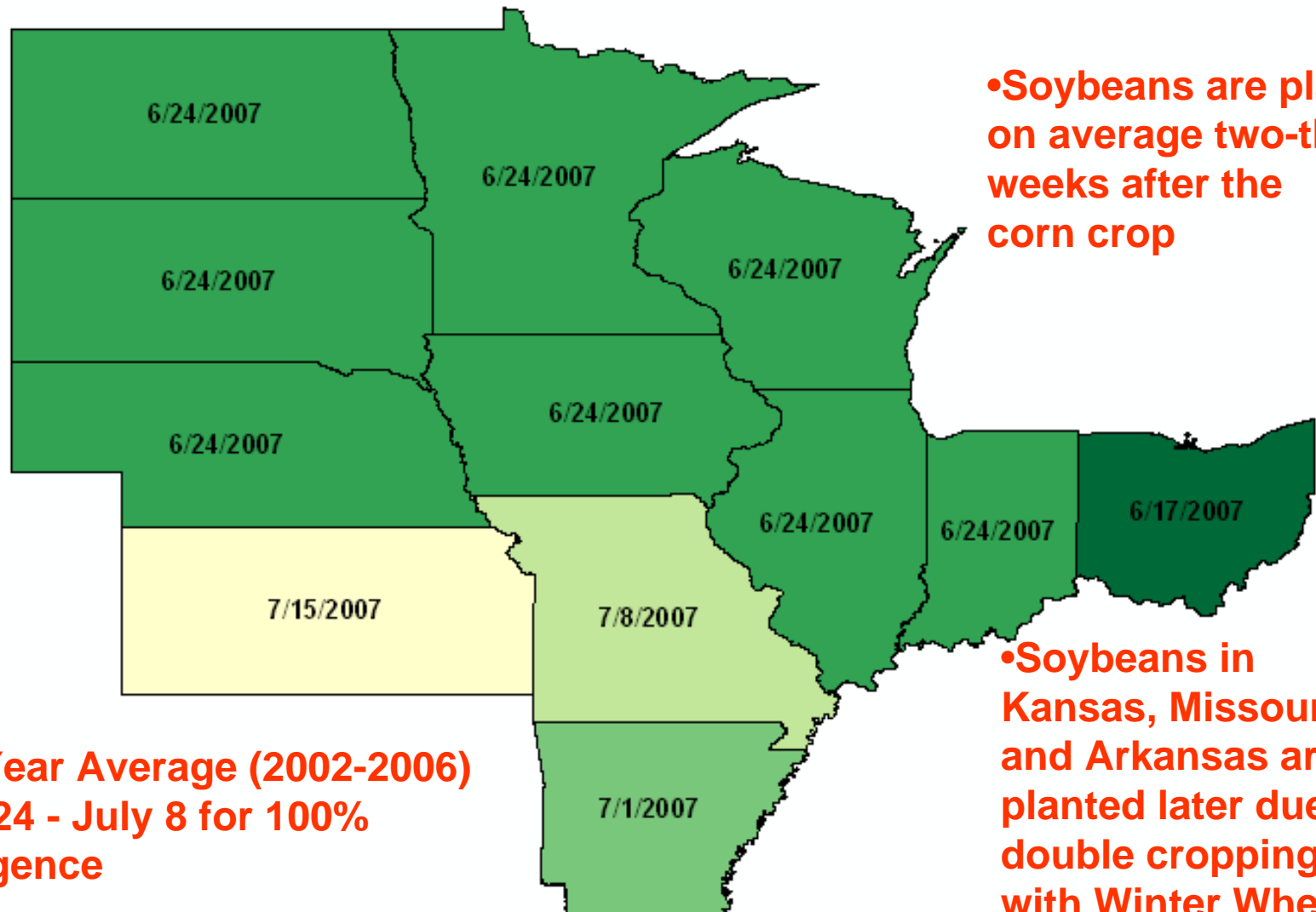
Date of 100% Emergence, 2007



**Five Year Average (2002-2006)
June 17 for 100% Emergence
-Except South Dakota (6/10)**

Soybeans Across the U.S. Heartland

Date of 100% Emergence, 2007

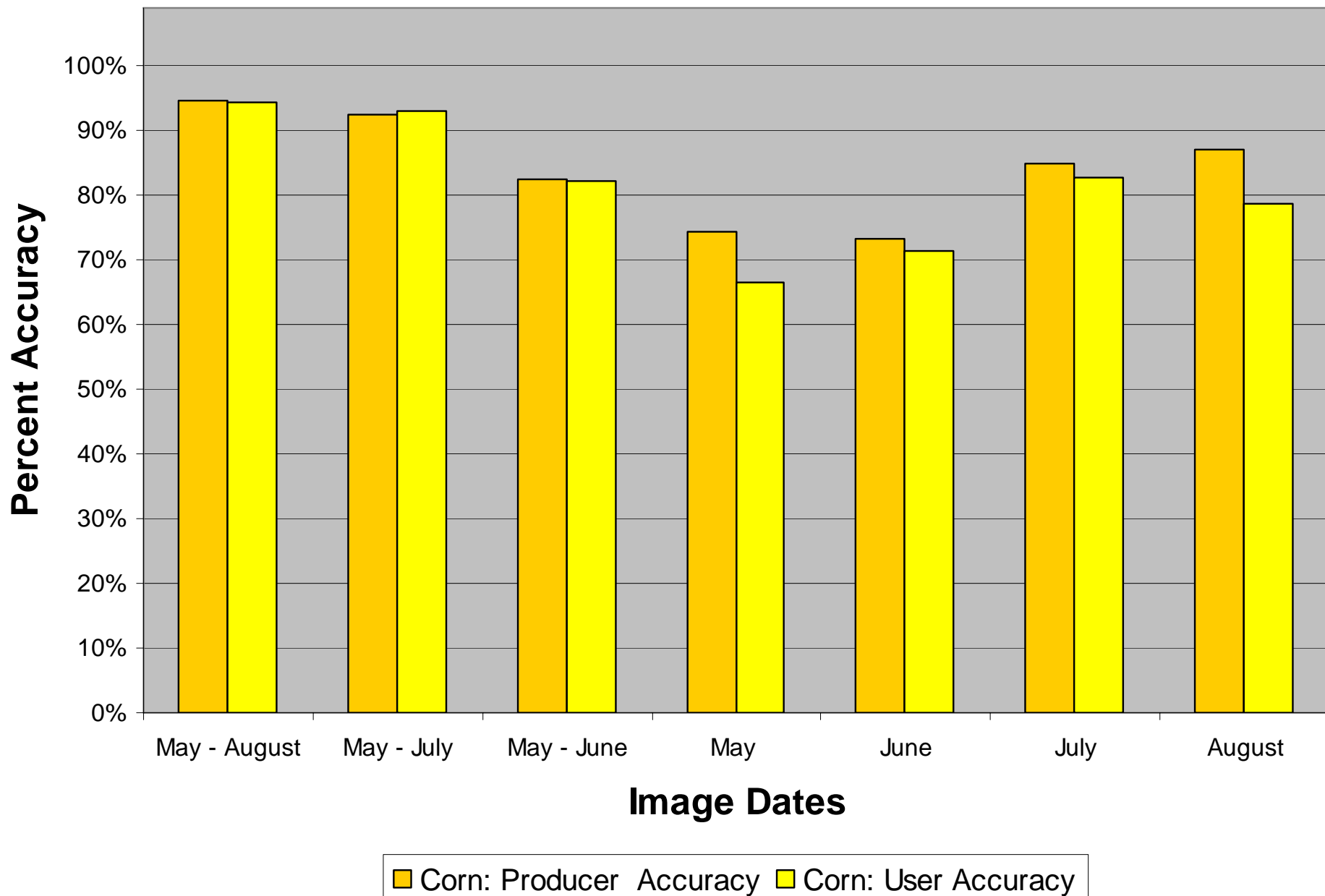


•Soybeans are planted on average two-three weeks after the corn crop

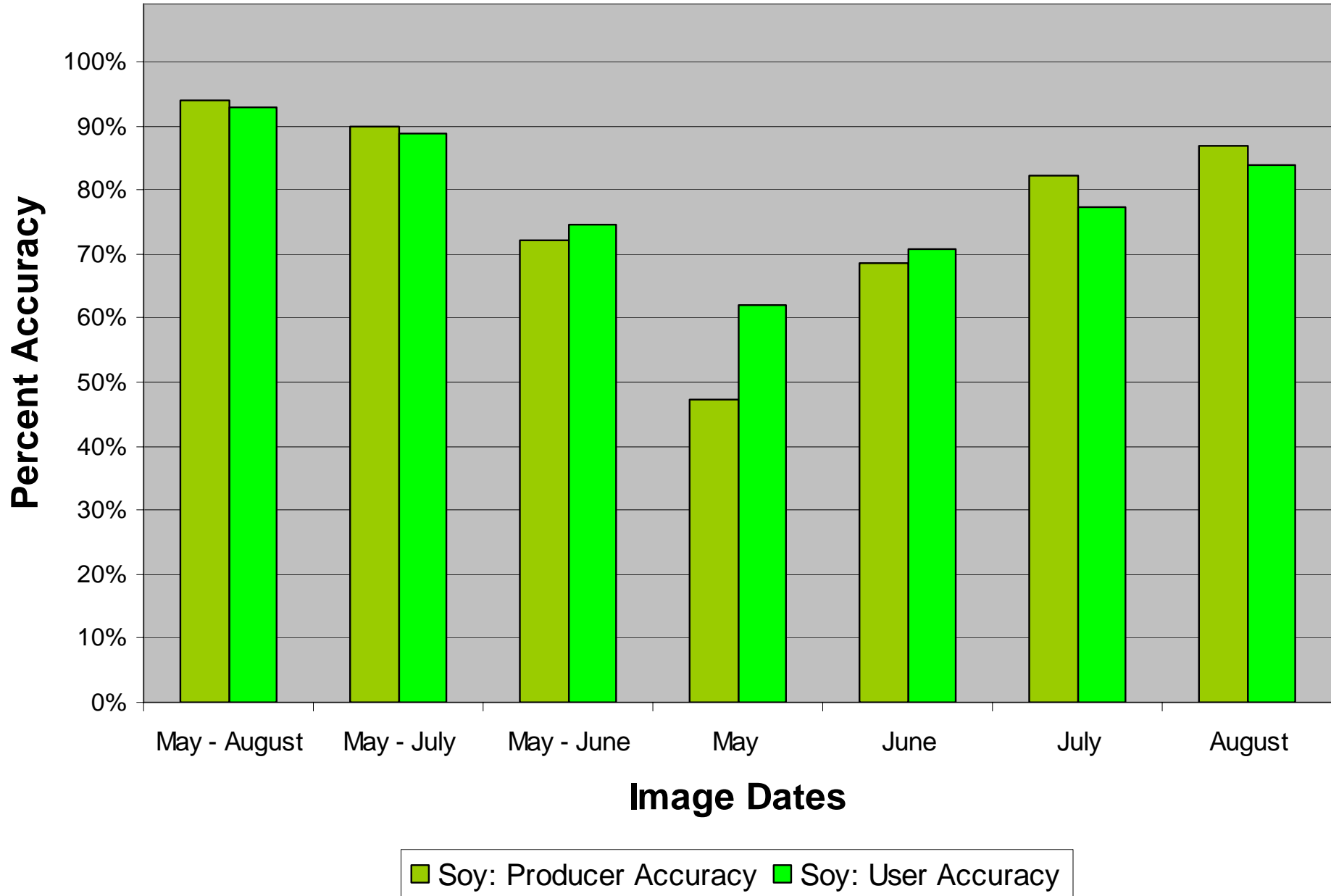
•Soybeans in Kansas, Missouri and Arkansas are planted later due to double cropping with Winter Wheat

Five Year Average (2002-2006)
June 24 - July 8 for 100%
Emergence

Average Corn Accuracy – U.S. Heartland



Average Soybean Accuracy – U.S. Heartland



Average Corn and Soybean Accuracy U.S. Heartland

Percentage loss in accuracy highlighted
from 4 date (May – Aug) classification

May - Aug		May - July		May - June		May Only	
C.P	C.U.	C.P	C.U.	C.P	C.U.	C.P	C.U.
94.55%	94.48%	92.61%	93.07%	82.58%	82.10%	74.34%	66.48%
		(1.94%)	(1.41%)	(11.97%)	(12.38%)	(20.21%)	(28.00%)

May - Aug		May - July		May - June		May Only	
S.P	S.U.	S.P	S.U.	S.P	S.U.	S.P	S.U.
93.90%	92.81%	89.88%	88.88%	72.25%	74.51%	47.39%	62.04%
		(4.02%)	(3.93%)	(21.65%)	(18.30%)	(46.51%)	(30.77%)

Accuracy Measures

C.P. - Corn Producer

S.P. - Soybean Producer

C.U. - Corn User

S.U. - Soybean User

Conclusions

- **Without August AWiFS Data-Reductions in Accuracy**
 - **Corn: 1.41% - 1.94%**
 - **Soybeans: 3.93% – 4.02%**
- **Without July and August AWiFS Data-Reductions in Accuracy**
 - **Corn: 11.97% - 12.38%**
 - **Soybeans: 18.30% - 21.65%**
- **AWiFS collects through July are essential to produce highly accurate corn and soybean classifications.**



Conclusions

- **Most Valuable Single Date AWiFS**
 - **Corn: July or August**
 - **Soybeans: August**
- **Future Research**
 - **Incorporate MODIS 16-Day Composite Data into the analysis**

Thank You

Claire Boryan, Mike Craig, Mary Lindsey

claire_boryan@nass.usda.gov

703-877-8000 x107

www.nass.usda.gov

datagateway.nrcs.usda.gov

