

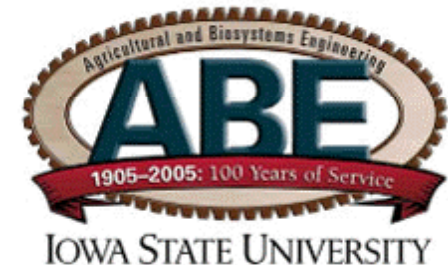


High-Throughput Near Infrared (NIRS) Analysis for Plant Breeding Applications

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Welcome to the Department of

Agricultural and Biosystems Engineering



Near-Infrared Spectrometers

FOSS/Tecator Infratec 1241

Wavelength range: 850-1048 nm, (400-1048 nm optional)

Transmittance (flow-through cell)

Used by USDA - GIPSA



Near-Infrared Spectrometers

Bruins OmegaG

Wavelength range: 750-1100 nm, 0.5 nm increments

Transmittance (flow-through cell)

New in 2001



Near-Infrared Spectrometers

Perten DA-7200

Wavelength range: 950-1650 nm, 256 element diode array

Reflectance (rotating cup)

New in 2002



GrainScan - Microsoft Visual Basic [design] - [frmNetworkSQL (Code)]

File Edit View Project Format Debug Run Query Diagram Tools Add-Ins Window Help

cmdConnect Click

General

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The image shows a yellow New Holland TR 88 combine harvester in a field. The harvester is viewed from a side-rear angle. It features a large black cab with a yellow frame, a long yellow auger extending to the right, and a large black tire with a yellow rim. The side of the harvester has "NEW HOLLAND" written in white on a dark purple stripe, and "TR TWIN ROTOR 88" in black on a yellow background. A white panel on the side has "ALMACO" and "MOBILE NIR GRAIN ANALYSIS" printed on it. The harvester is positioned in a field of harvested corn, with some green grass in the foreground.

Zeiss Corona

Wavelength:1000-1700 nm

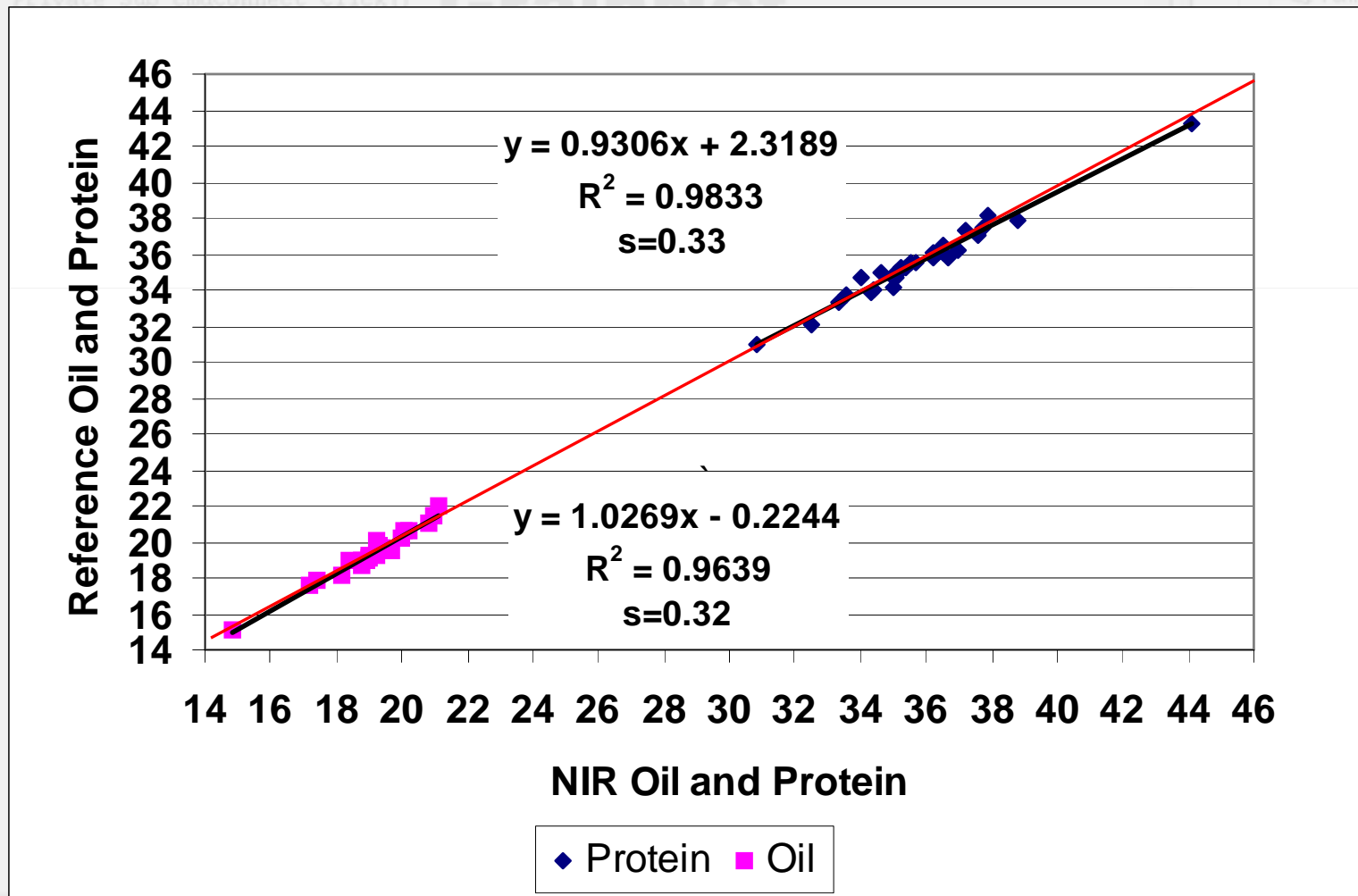
128 element diode array

Reflectance



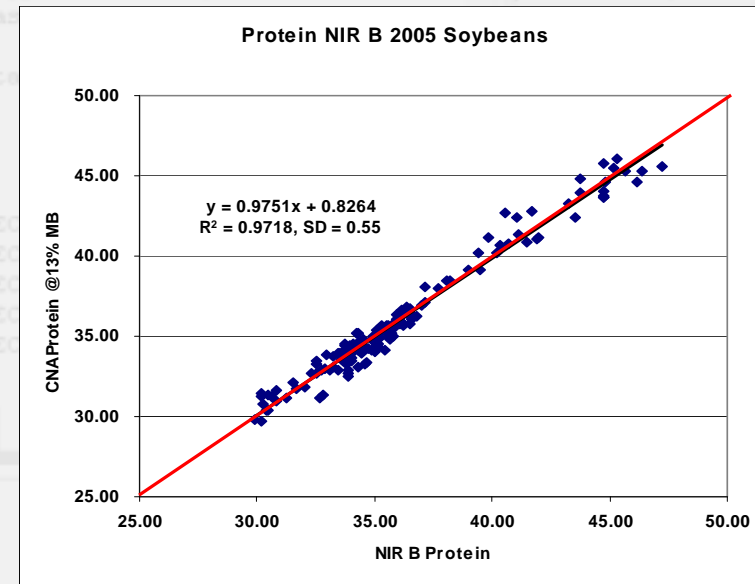
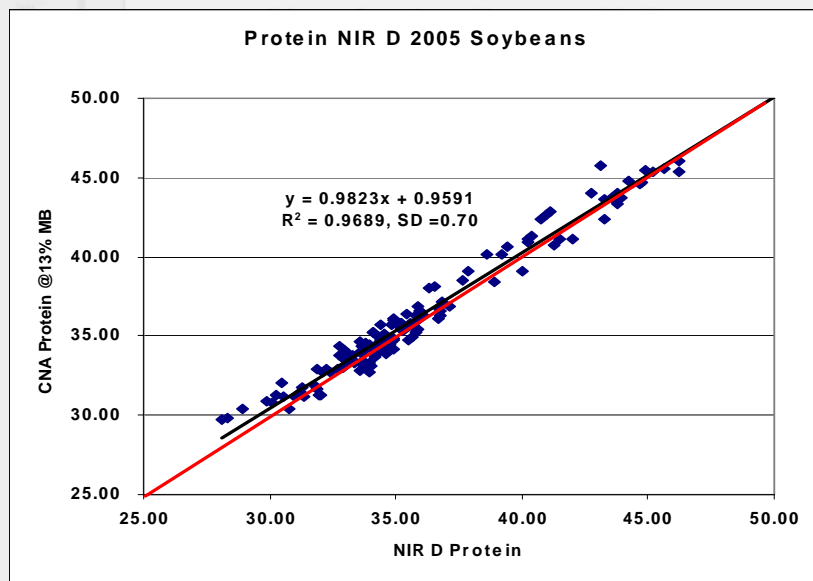
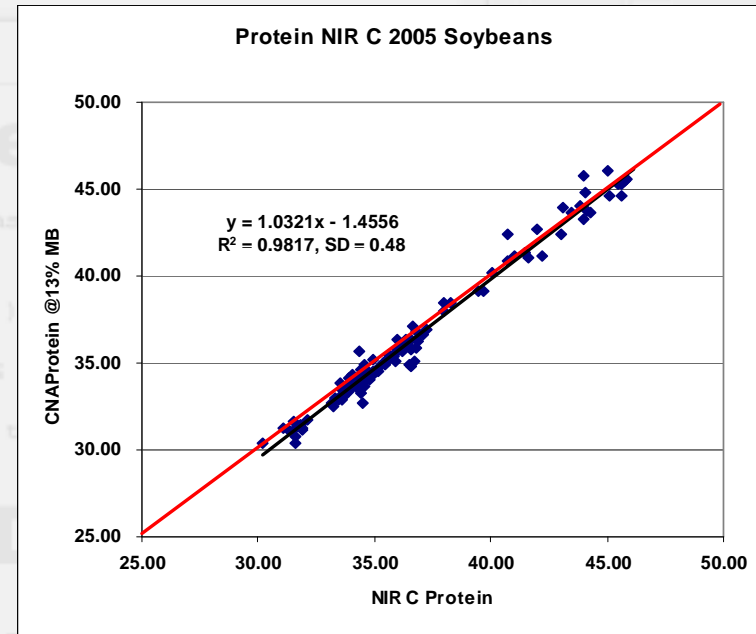
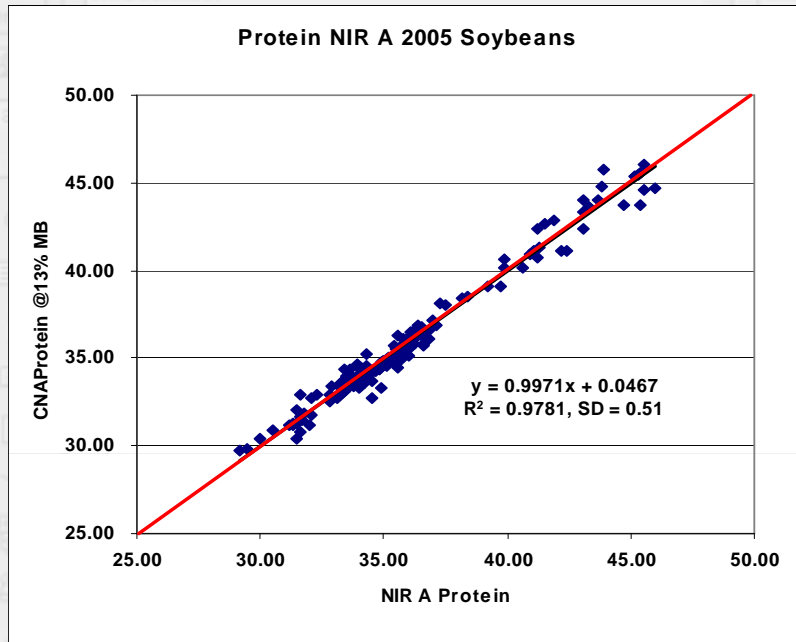
Accuracy – Check Samples

SQT Samples – Infratec 1229, Whole Soybeans

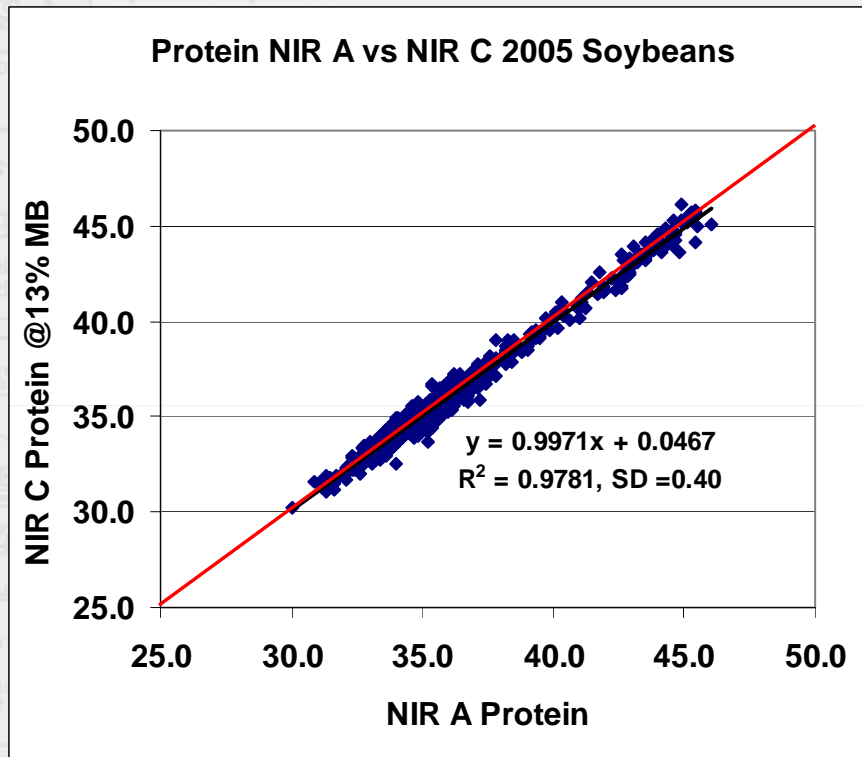


Basis 13% Moisture

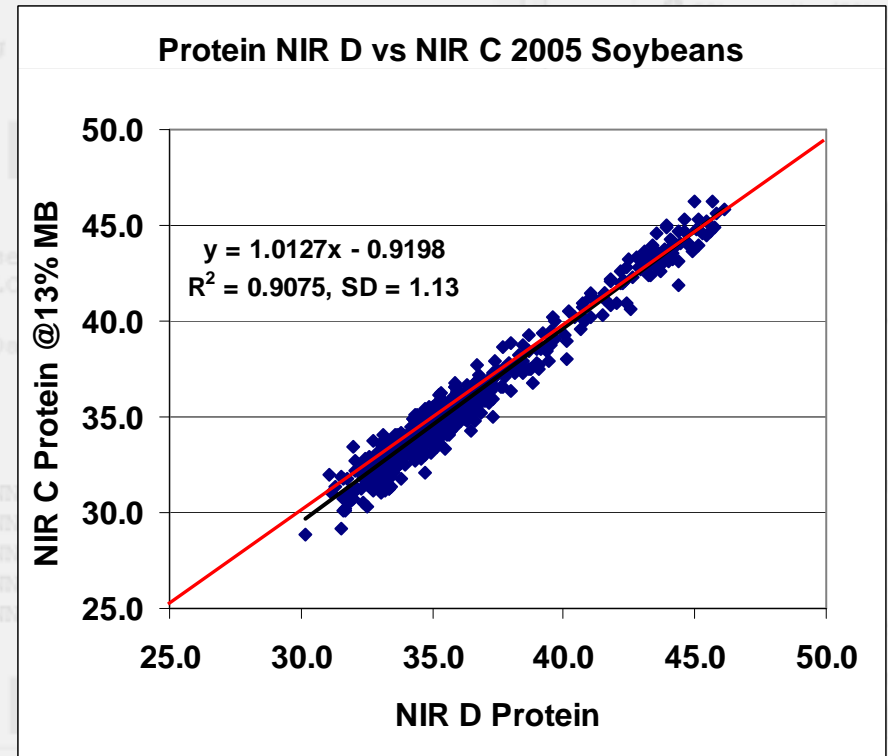
NIR Validation Set, Soybean Protein



Comparison of NIR Units

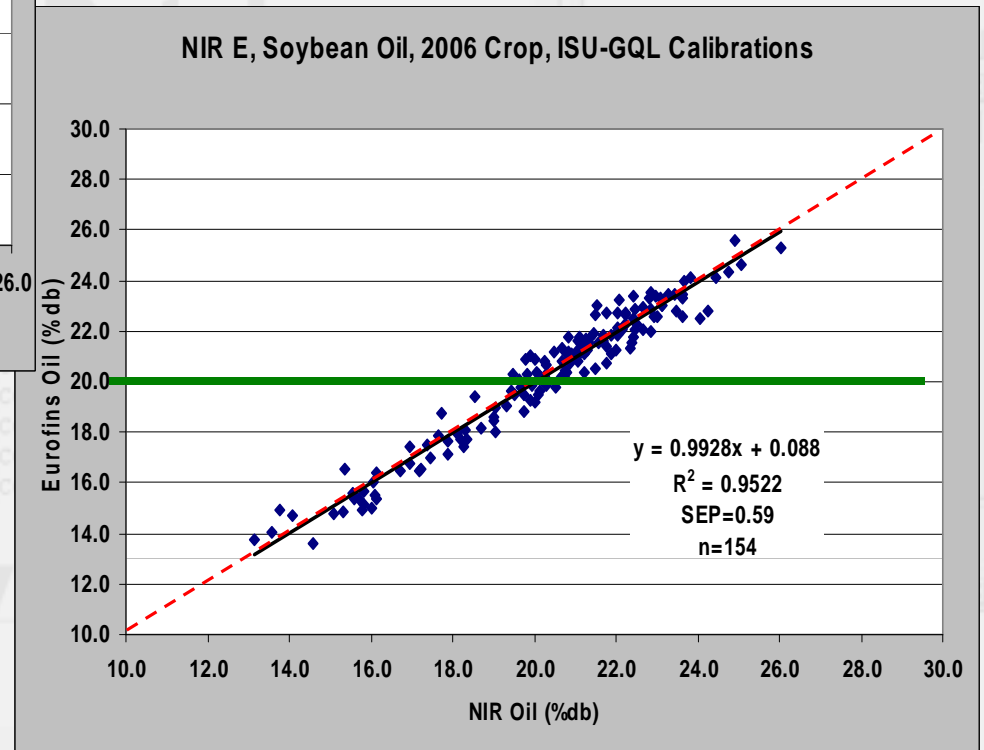
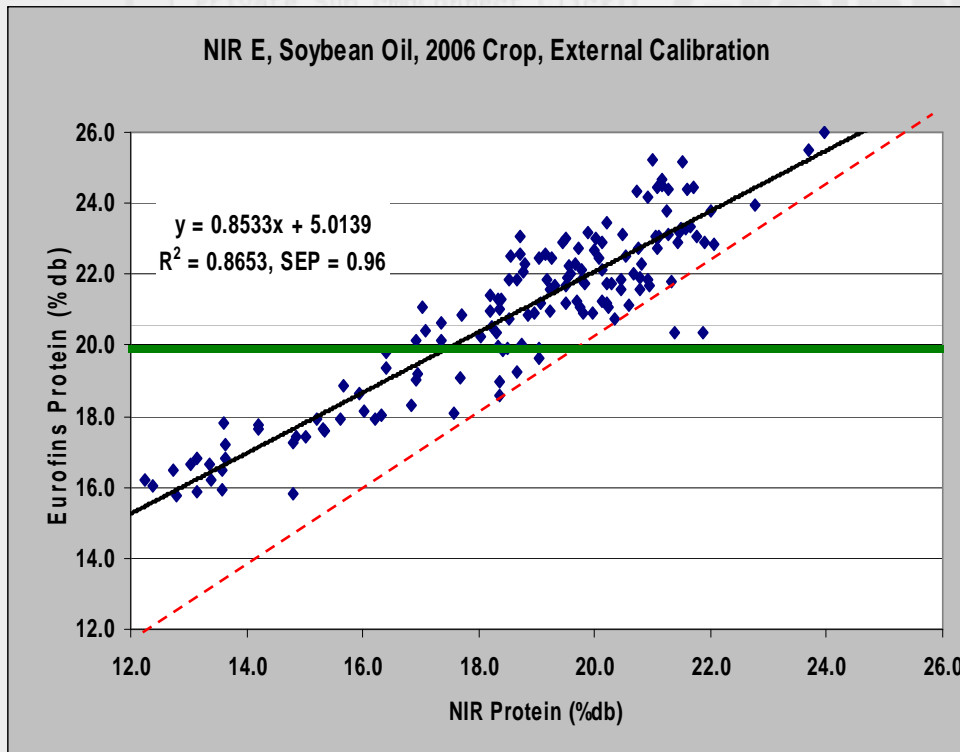


Similar technology (transmittance)

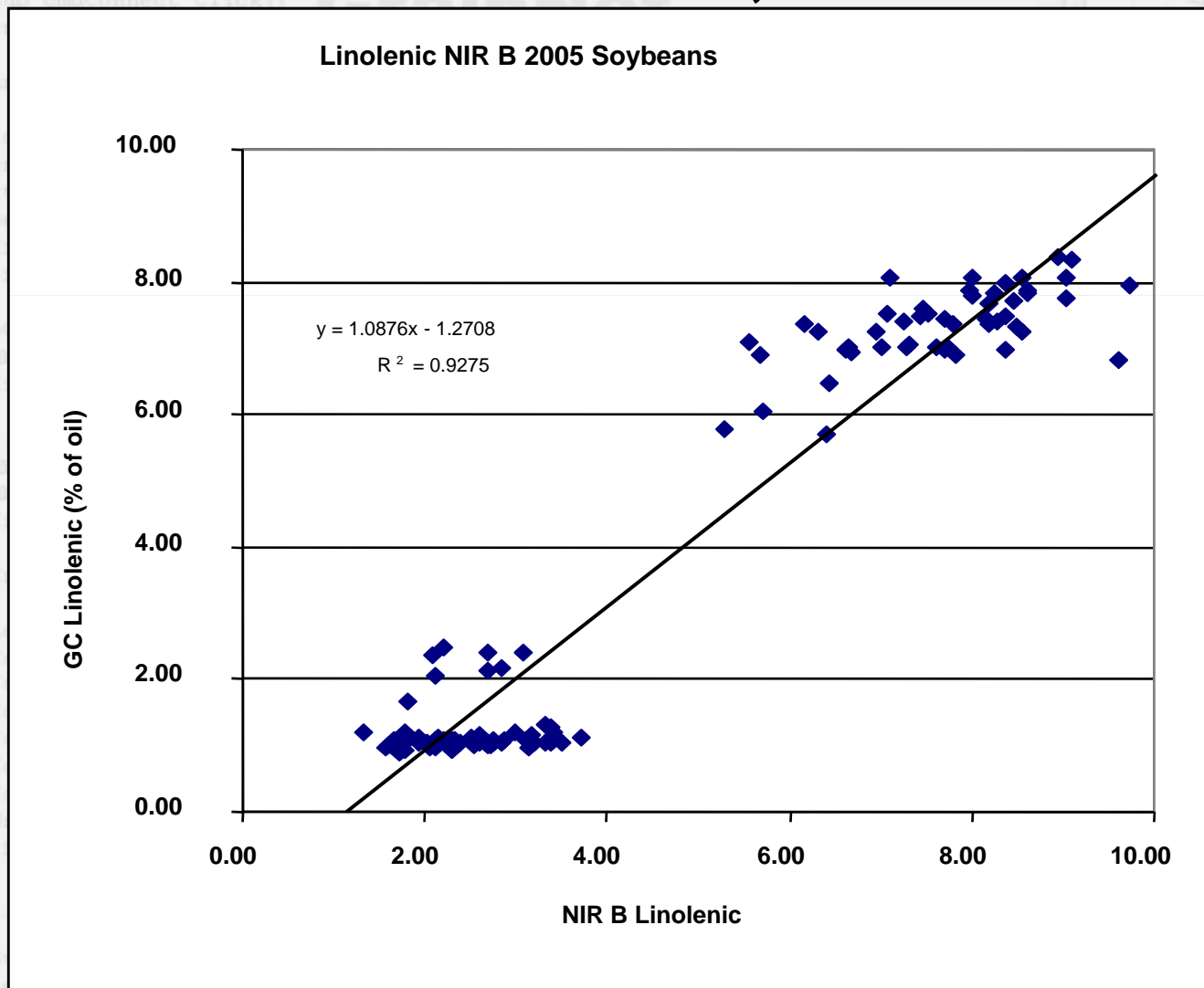


Reflectance vs. Transmittance 9

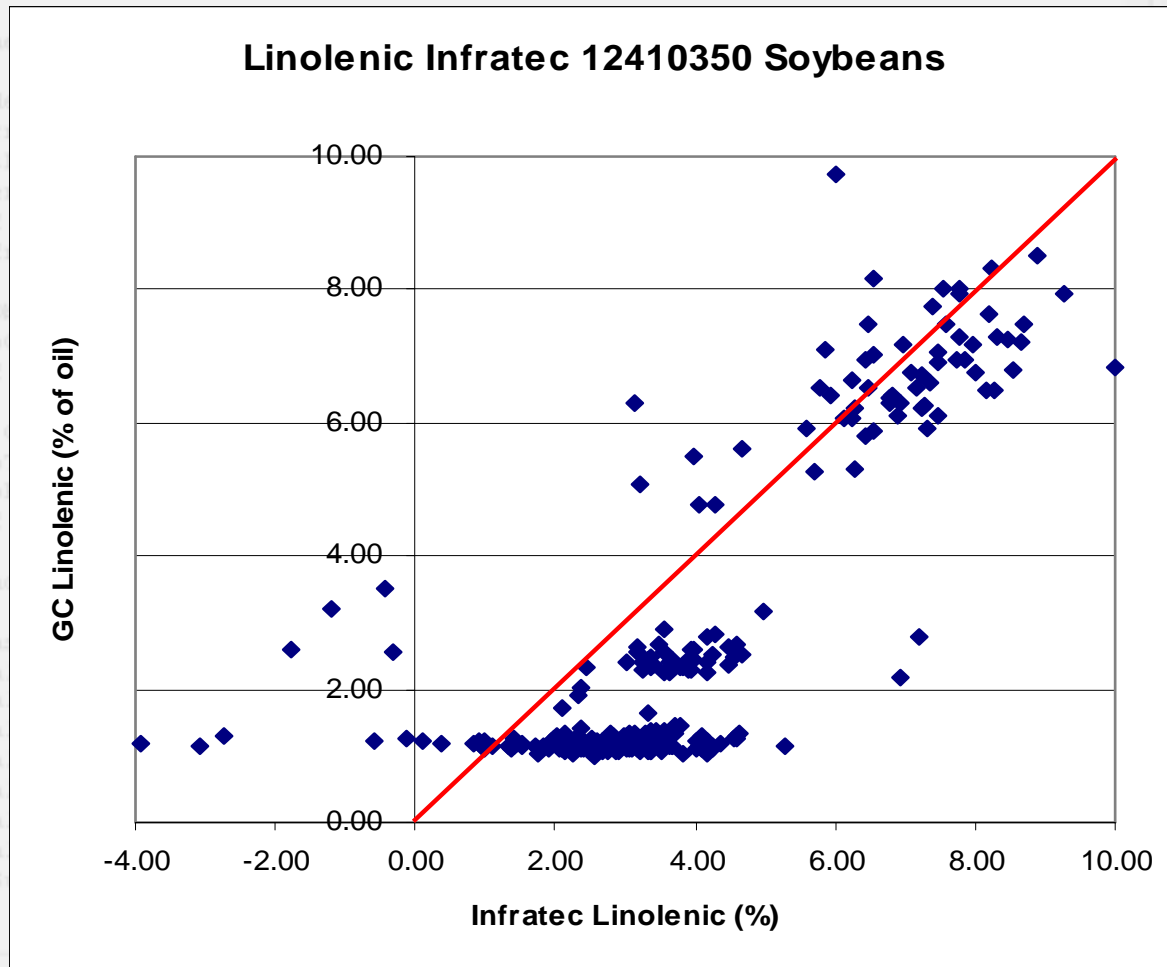
Same Unit and Spectra, Different Calibrations



Discrimination Only – Soybean Linolenic Acid, 2005



Discrimination Only – Soybean Linolenic Acid, 2007



Summary

- **Technical issues for NIR:**
 - Sample size
 - Portability and mobility
 - Algorithm selection, evaluation
 - Standardization, harmonization
 - Discrimination versus measurement
- **Legal and regulatory issues:**
 - Database creation/acceptance/sharing
 - Inspection and certification
 - Complex nature of non linear models, if used
 - What is patentable; challenging patents is expensive.

Contributors

- **Sylvie Roussel** Now at Cemagref
- **David Funk** GIPSA
- **Bob Cogdill** Now at UNL
- **Connie Hardy**
- **Glen Rippke**
- **Igor Kovalenko** Now at BASF
- **Robert Dzubin** Now at IBM
- **Benoit Igne**
- **Many undergraduate students**

Where To Find Us...



www.iowagrains.org

www.grainlab.org