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Grain Quality LABORATORY

IOWA STATE UNIVERSITY

Iowa Grain Quality Initiative

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

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Welcome to the Department of
Agricultural and Biosystems Engineering

Agricultural and Biosystems Engineering
ABE
1905–2005: 100 Years of Service
IOWA STATE UNIVERSITY

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


NEW HOLLAND
TR
TWIN ROTOR
88
NEW HOLLAND

Zeiss Corona

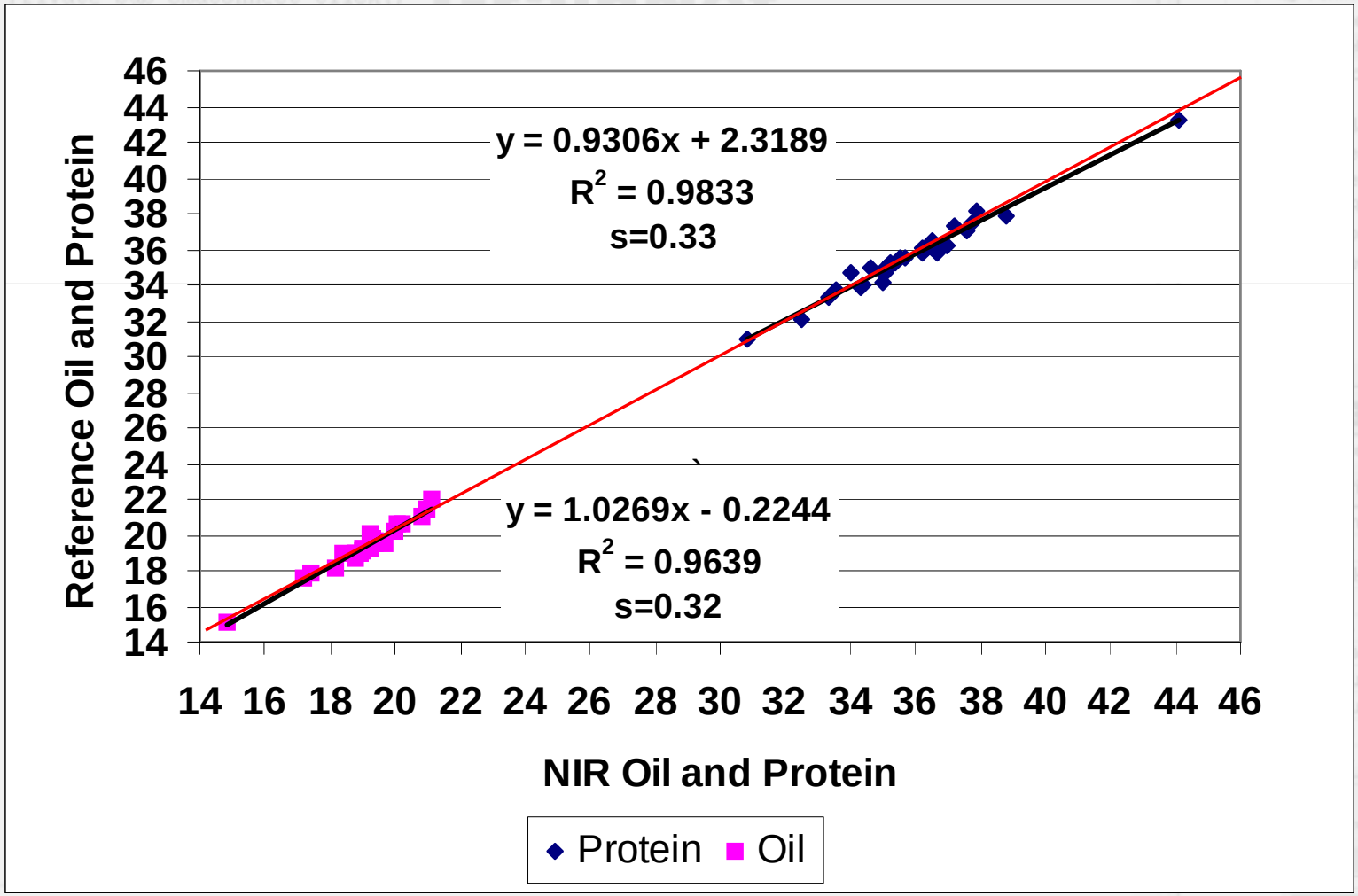
Wavelength:1000-1700 nm

128 element diode array

Reflectance

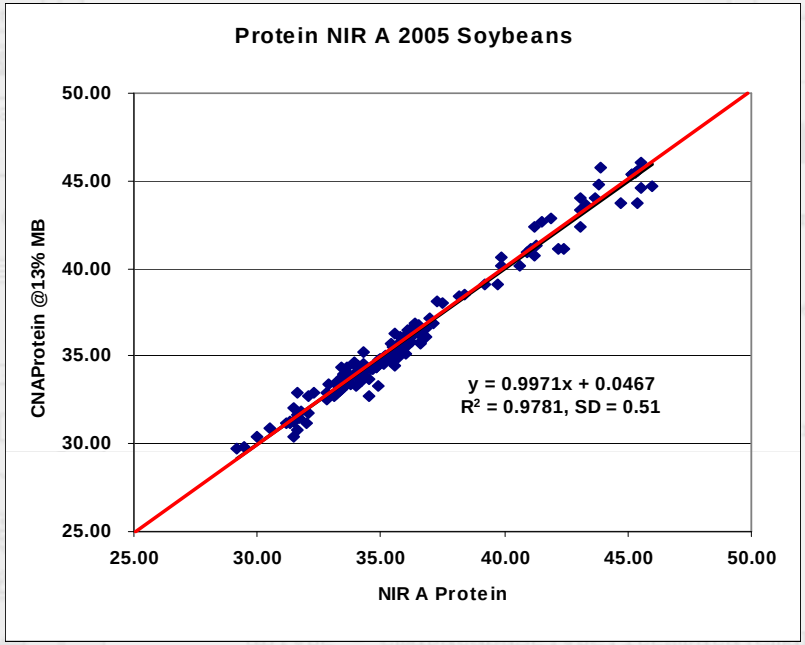
Accuracy – Check Samples

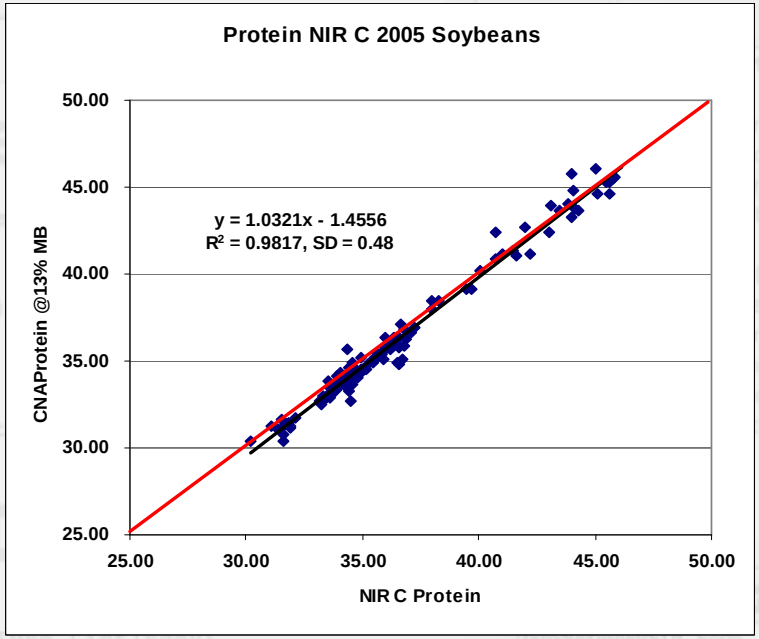
SQT Samples – Infratec 1229, Whole Soybeans

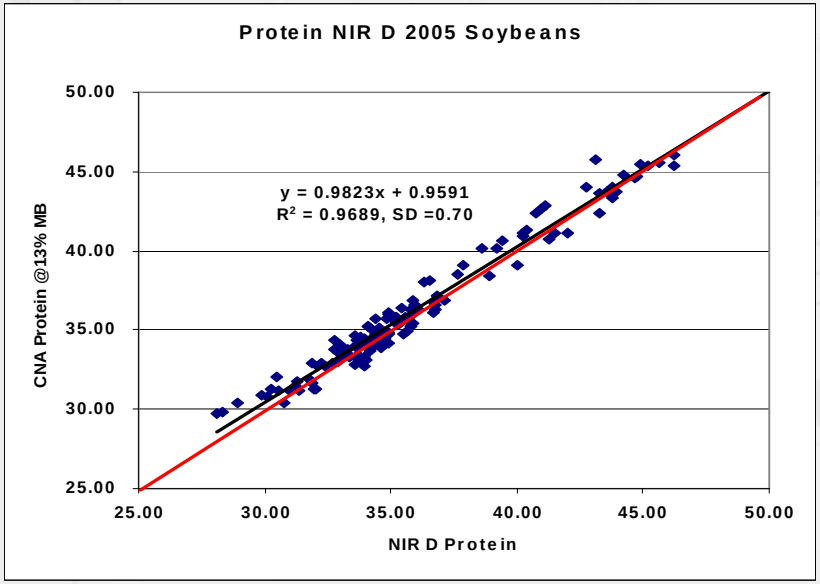


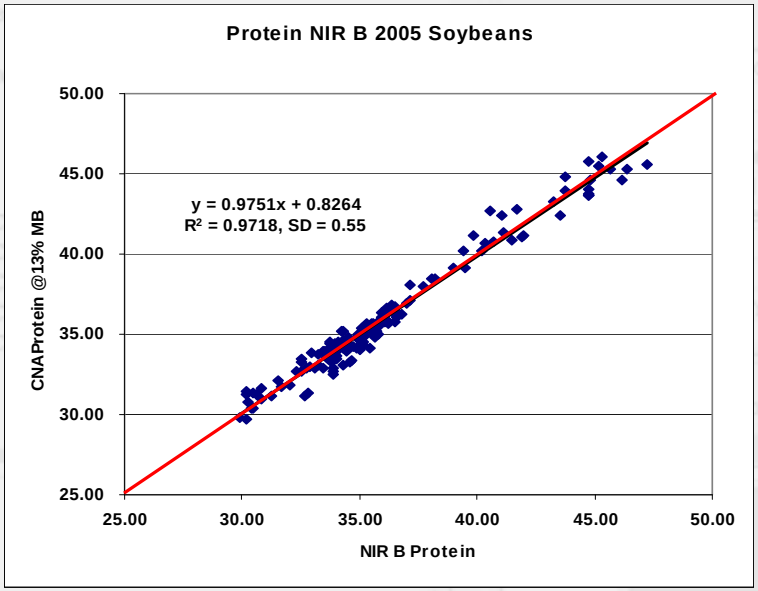
Basis 13% Moisture

NIR Validation Set, Soybean Protein

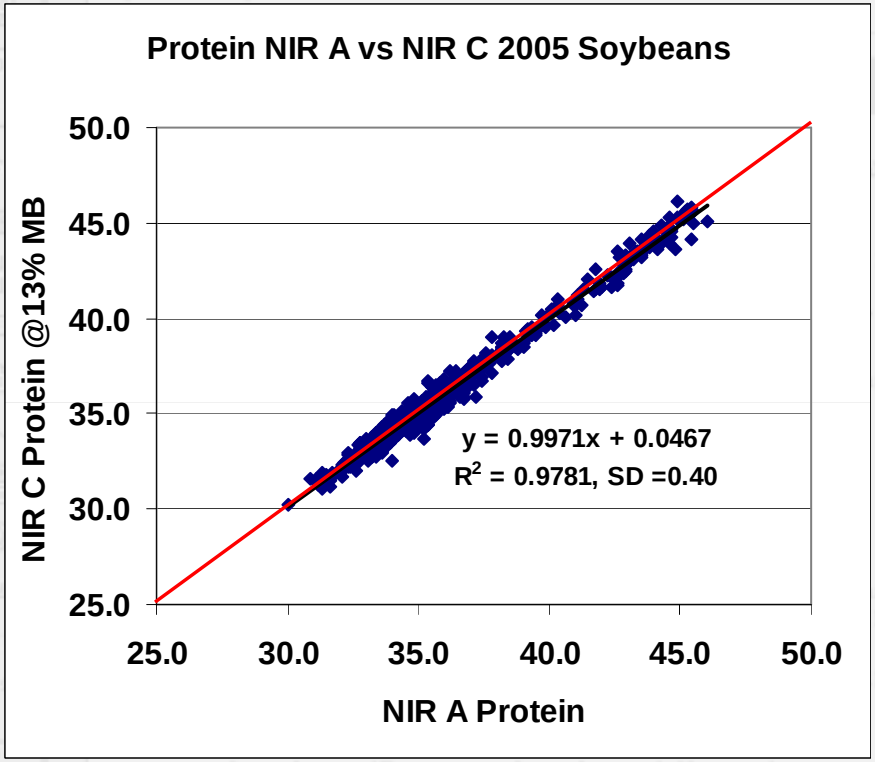




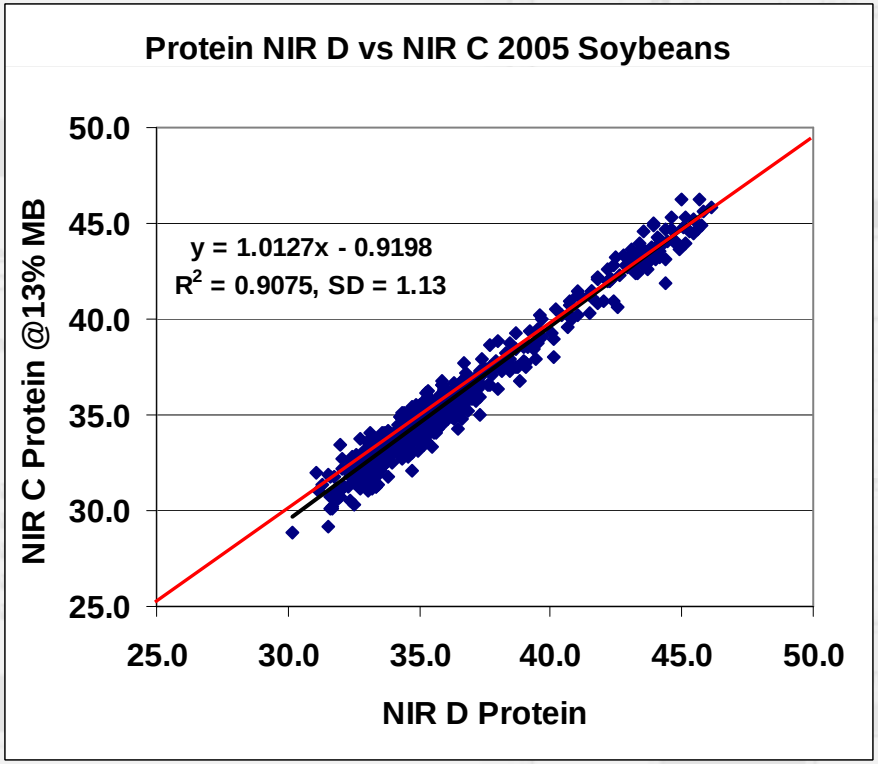




Comparison of NIR Units

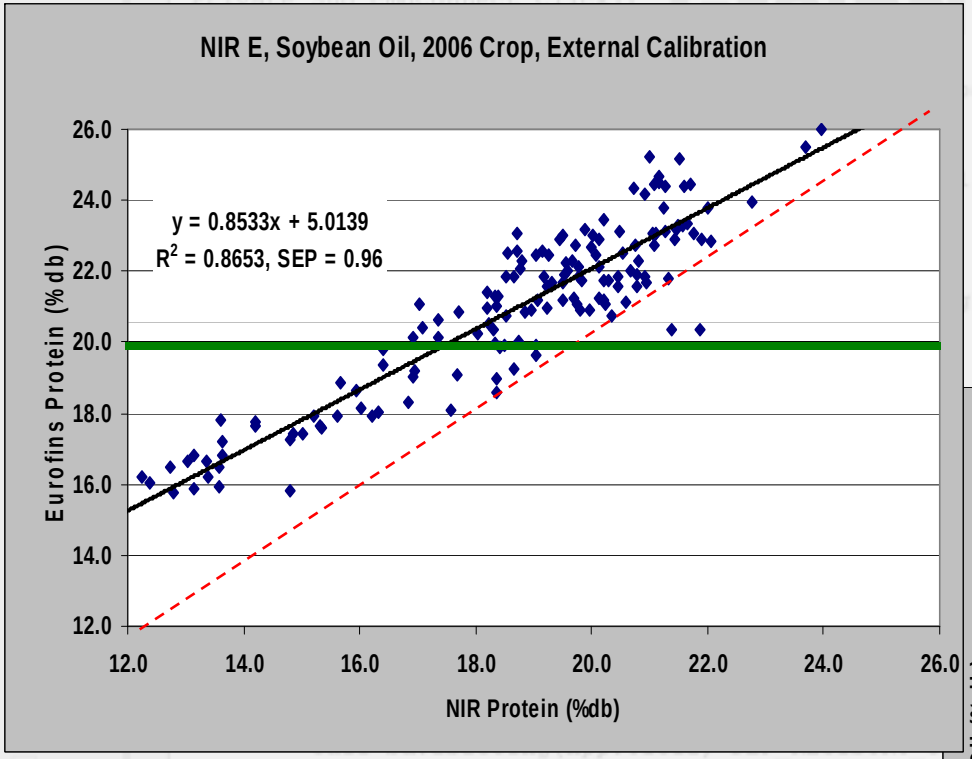


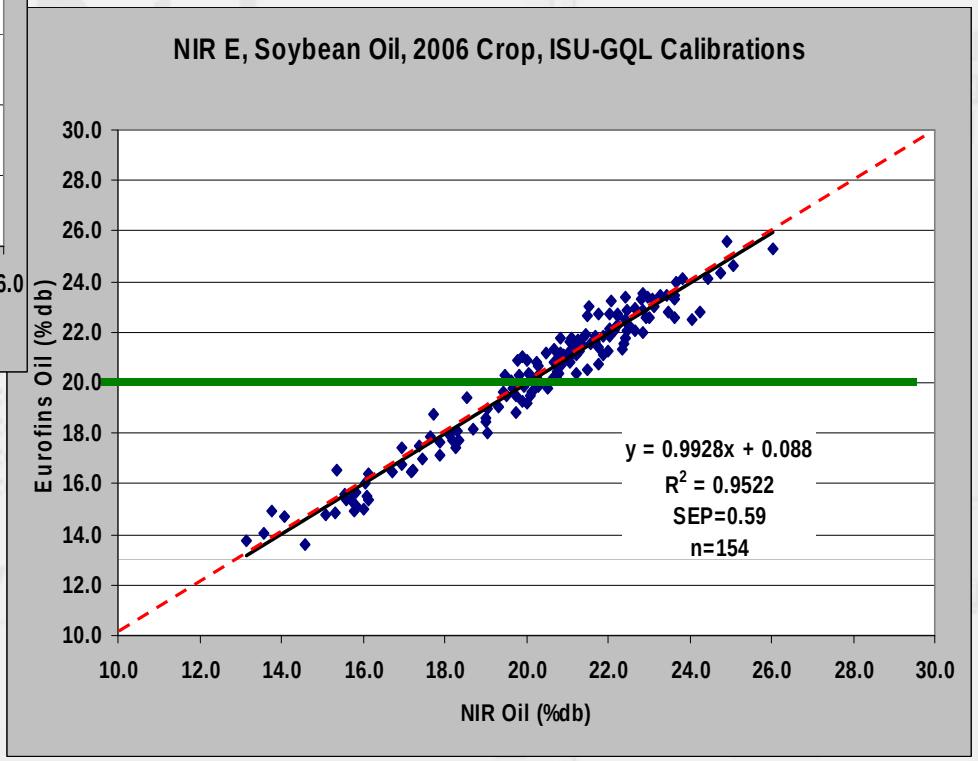
Similar technology (transmittance)



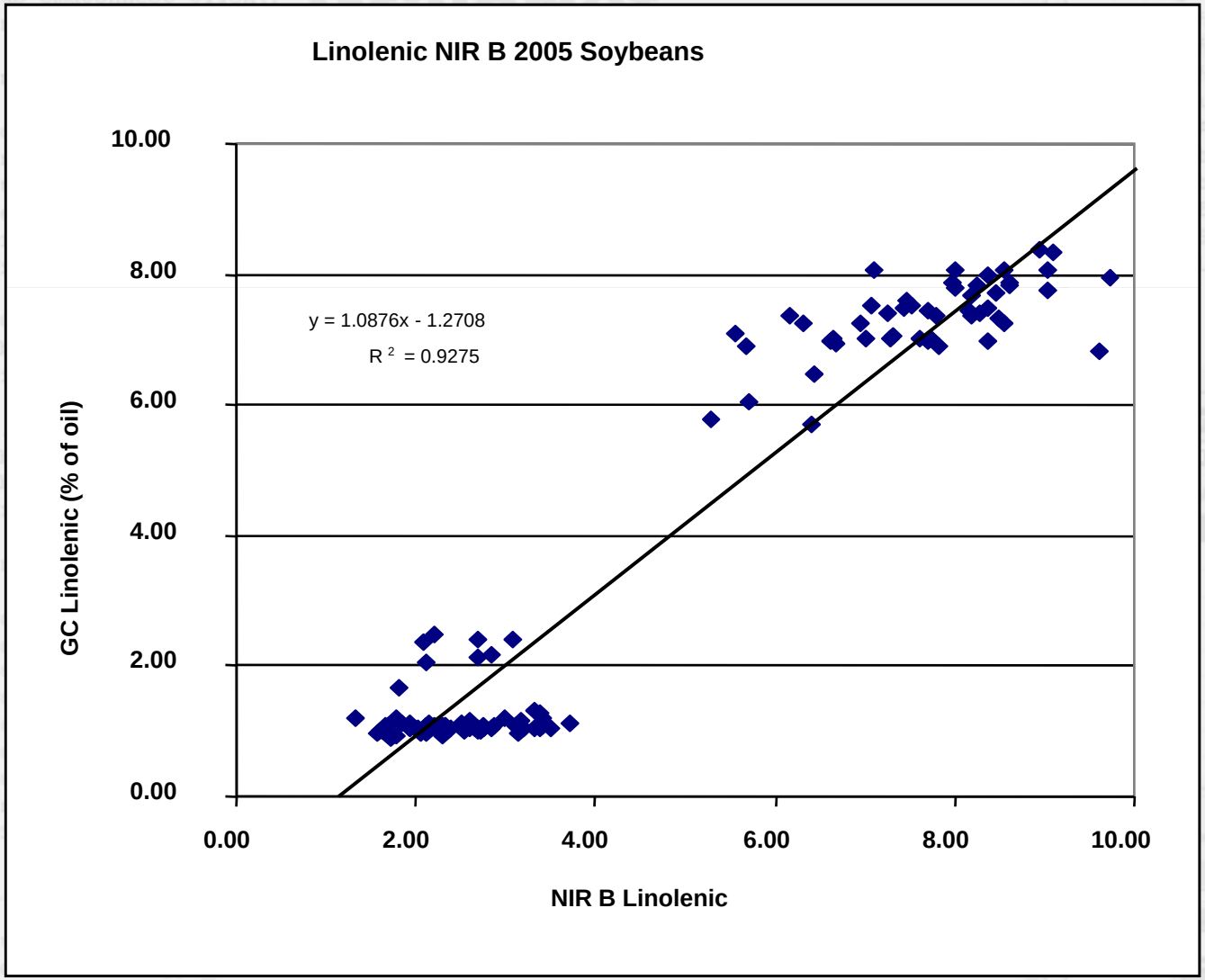
Reflectance vs. Transmittance

Same Unit and Spectra, Different Calibrations

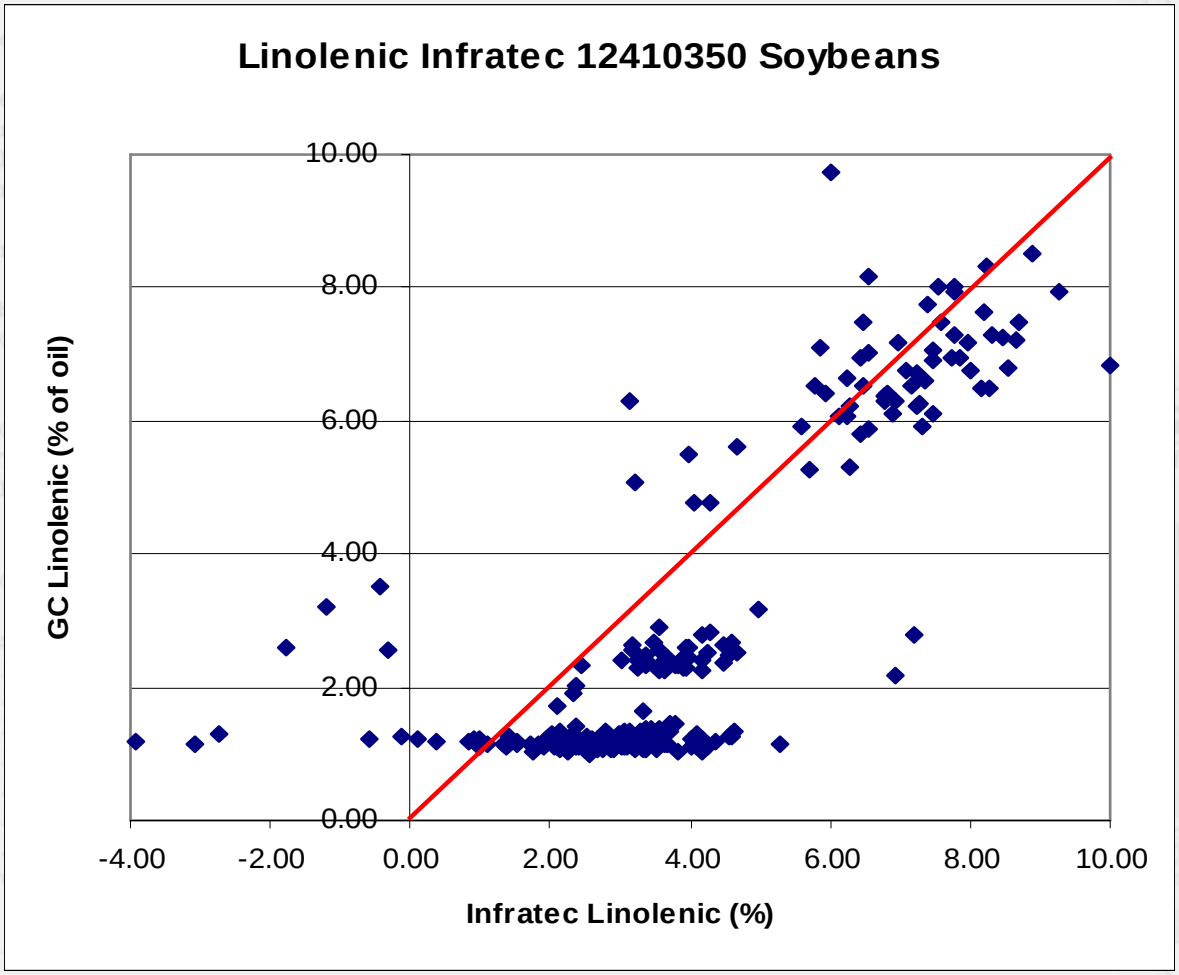




Discrimination Only – Soybean Linolenic Acid, 2005



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 Dzupin** — **Now at IBM**
- **Benoit Igne**
- **Many undergraduate students**

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