NDSU Canola Seed and Biodiesel Quality Evaluation

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NDSU “Pilot Plant”

Vegetable Oil Process & Analysis

Mission (in COE)

- *High throughput* analysis of canola seed

High-throughput seed analysis

DA7200 NIR Analyzer (Perten Instruments Inc.)

- Nondestructive seed analysis
- Seed analysis:
  - Oil Content
  - Moisture Content
  - Fatty acid composition
  - Protein
- Accommodate small sample size (15 g)
- Rapid (400 samples / day)

ND Dept of Commerce, 2007

High-throughput seed analysis

- DA7200 NIR Analyzer
  - NDSU provides reference chemistry data
  - Perten provides calibration support
- Initial Calibration Development
  - NDSU – 83 samples
  - Canadian Grain Council – 36 samples
- NIR Performance
  - 2 checks used throughout the analysis
  - Participation in CGC canola lab proficiency program

Reference Chemistry

- Oil Content
  - Oil Extraction with Dionex
- Moisture
  - Oven Dried Method
  - Range of 5-13%
- Fatty Acids
  - GC analysis provided by USDA-ARS, Fargo

Breeding Campaigns

Fall 2007	5 ND Locations: Minot, Langdon, Carrington, Prosper, Williston	3400 samples analyzed
Spring 2008	Overwintering nursery in Chile	1600 samples analyzed
Fall 2008	7 ND Locations: Minot, Langdon, Carrington, Prosper, Williston, Hettinger, Rugby	3100 samples analyzed

Collaborations

Northern Canola Growers Association	Nov. 2007	150 samples
Iowa State	Jan. 2008	20 samples
NDSU Plant Pathology Dept.	Jan. 2008	30 samples
Monsanto	Sept. 2008	650 samples

Challenges

- Amount of time to analyze
- Arrival/harvest dates unpredictable
- Manpower
  - Scheduling Student Workers
- Cleaning

Ongoing Research

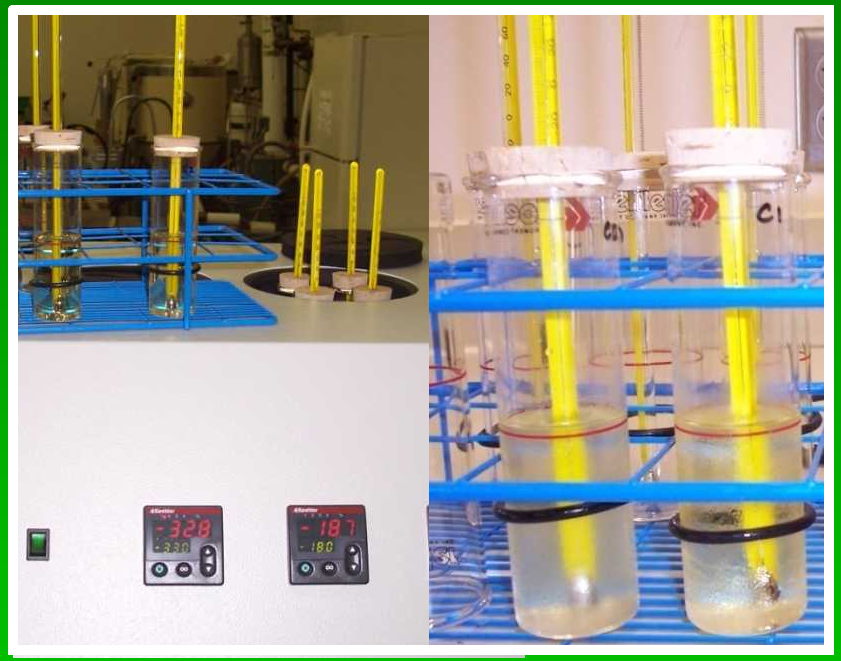
- Expanding moisture content and oil content calibration range
- Evaluate calibrations:
  - Erucic
  - Glucosinolates
  - Chlorophyll
  - Extracted oil

NDSU Biodiesel Quality Analysis

ASTM D6751

- Cloud point
- Cold soak filtration
- Oxidative stability
- Total glycerin
- Moisture content
- Kinematic Viscosity
- Acid number

Cold Flow Properties



Cloud Point

Canola BD - 26°F
Soy BD - 38°F

Cold soak filtration

Canola BD - 105 sec
Soy BD - 156 sec

Current Biodiesel Research

- Developing *in-situ* transesterification methods ***in-situ*** (biodiesel made directly from seed)
  - assess advanced breeding lines
  - high-throughput
  - impact of location on quality
  - cold flow properties and storability.

Future Biodiesel Research

- Develop NIR calibrations for ASTM specifications including: total glycerol, moisture, free fatty acids, cloud point.
- Develop NIR calibrations for detecting biodiesel blends

Renewable Resins for Composites

Questions?