

Time Domain-NMR with chemometric analysis : An alternative tool for determining the protein content in sunflower seeds



Louidiyi Mohammed, Le Dorze François, Fintz Christine, Lem Patricia



GEVES

Expertise & Performance

- **GEVES** (French Variety and Seed Study and Control Group) has three official missions:

- Registration of new plant varieties in the official catalogue
- Legal protection of varieties (plant variety rights)
- Seed certification according to international standards

GEVES is organised internally into three operating divisions for its technical activities (Seed testing, Variety testing, and Molecular biology and biochemistry=BioGEVES).

Its missions include involvement in research activities.

- In relation with the VCUS (Value of Cultivation, Use and Sustainability) Testing, BioGEVES conducted an exploratory study to quantify and qualify sunflower proteins
- Methods for measuring protein content :
 - Reference method : Kjeldahl (destructive, time consuming, use of solvent)
 - Infrared spectrometry
 - Nuclear Magnetic Resonance (NMR)

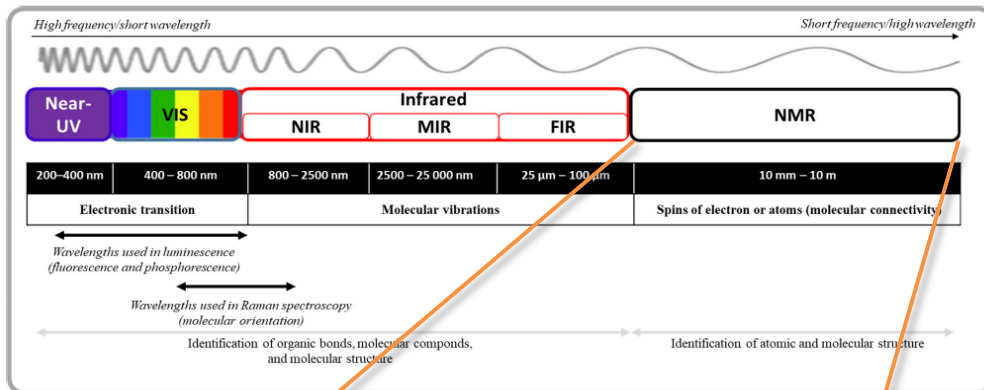


GEVES

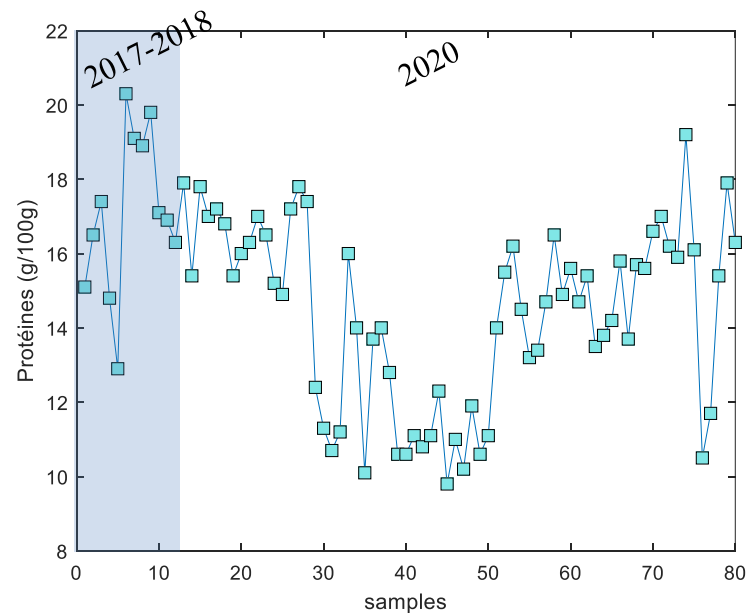
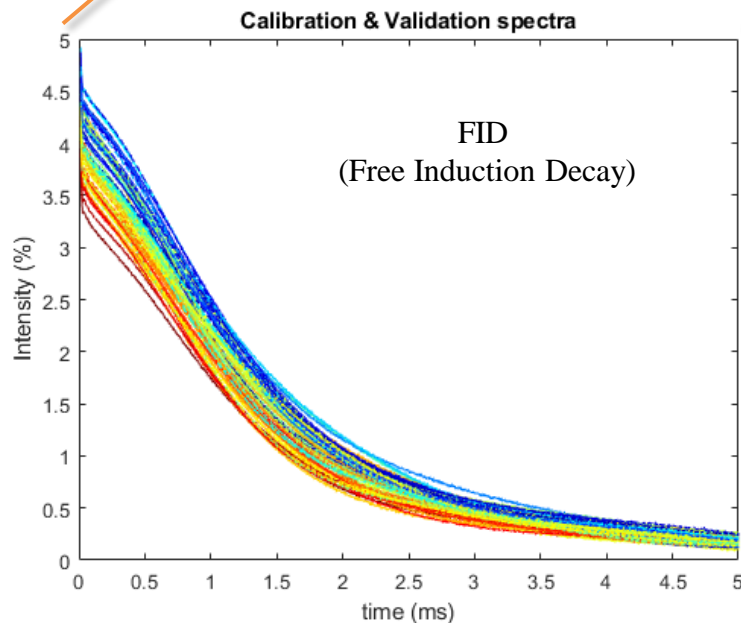
Groupe d'Étude et de contrôle
des Variétés Et des Semences

MATERIALS AND METHODS

Principle of different electromagnetic techniques used to analyze products (Loudiyi et al. 2020)

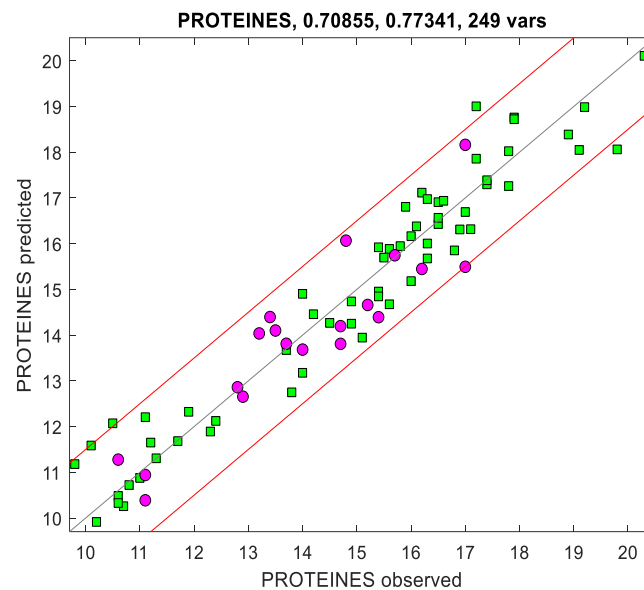
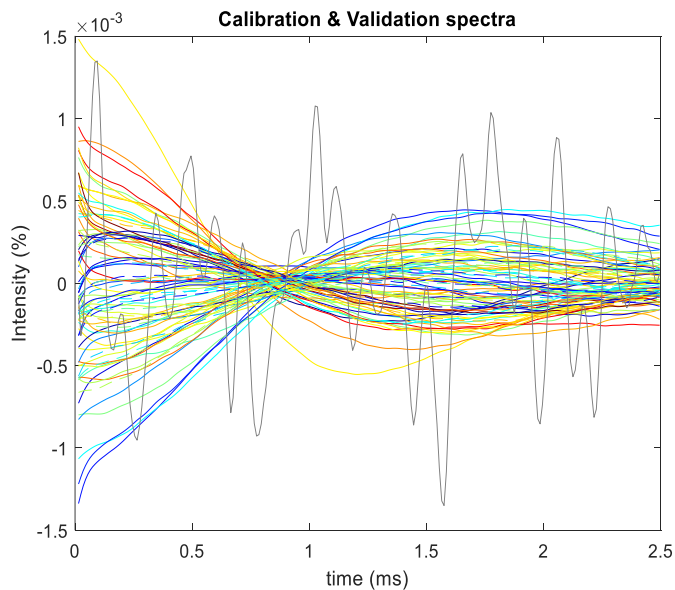


Minispec mq10 (0.23 T ; 10 MHZ) spectrometer (Bruker, Bullerica, USA)



Pretreatments : variable selection (0.01 to 2.5 ms) ; smoothing ; normalization

■ Calibration (61 samples) ■ Validation (19 samples)



Performances (PLS – 8 LVs)

R ² (Cal)	0.93
R ² (Val)	0.82
RMSEC	0.7
RMSEP	0.77

RMSEP = 0.77 => uncertainty 1.4 (g/100g)

V_s (inc. proteins - Kjeldahl method) = 0.8

=>Future research : improving accuracy by adding a broader range of samples to the calibration set.