

NIR-spektroskopi för kvalitetsmätning av tomater

Kvalitetsdag för växthusodlare

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Tom Lillhonga

Projektledare, Yrkeshögskolan Novia (Vasa)

tom.lillhonga@novia.fi



Allmänt om NIR:

https://en.wikipedia.org/wiki/Near-infrared_spectroscopy

NIR-applikationer

Jord- & skogsbruk (kvalitetskontroll)

Energiproduktion (fukthalt, askhalt, energi-innehåll)

Kriminalogi (droger)

Material teknologi (filmer)

Sopsortering (plaster)

Livsmedelsindustri (kvalitetskontroll)

Miljö tillämpningar (bioreaktorer, biologisk vattenrening)

Pälsdjursnäringen (foderkök, pälskvalitet)

Petrokemisk industri (oktantal, kvalitetskontroll)

Medicin (fördelningar av verksamt ämne, falska läkemedel, insulinhalt)

Arkeologi (organska rester efter bosättningar, grottmålningar)



www.novia.fi

Vad mäter man med NIR inom lantbruk?

- **Spannmålskvalitet** (mjöl, bröd,...)

“Measurement of **protein and moisture in wheat** (and other grains) is probably the most widespread and successful NIR application in the world”

“Australian grain handling authority, CBH Pty Ltd has almost 200 grain receival points in Western Australia alone, and owns the largest network of NIR instruments in the world. **Wheat growers are paid on a protein-based system**. Many other grain quality indicators are routinely measured using NIR, including **hardness, flour yield, colour and water absorption (wheat) and malting quality (barley)**.”

- **Honung**

“Honey can be checked by NIR for **quality, adulteration or botanical origin**”

- **Sockerbetor**

“The sugar industry is a significant user of NIR for estimating **moisture, fibre and sugar (°Brix) content**.”

Vad mäter man med NIR inom lantbruk?

- **Hökvalitet**
- **Foderkvalitet**

“Assessment of **energy, fibre, protein, sugars** and other indicators of animal performance in forage, grain and mixed feed using NIR is now firmly established across livestock industries in many countries.”

“There is an increasing focus on NIR measurements on digestibility and even an index to indicate the danger of **acidosis** in ruminants fed high grain diets. NIR is also used to estimate **fermentation characteristics of silage**, such as **pH, ammonia nitrogen and volatile fatty acids**.”

“Following the BSE crisis, detection of ingredients in mixed feeds is a major issue. A large study has found NIR to be an important tool in **discriminating between acceptable and unacceptable ingredients**.”

Vad mäter man med NIR inom lantbruk?

- **Analys av grödor i fält och gödselbehov**

“Interest is growing in **in-field pasture monitoring, with portable NIR instruments**. **Grass and crop on-site analysis** for dry matter and nutrients with NIR sensors mounted on forage or grain harvesters.”

“**Prediction of nitrogen fertiliser requirements of crops**, particularly wheat, via NIR leaf tissue analysis, represents an important advance in cost-efficient application of fertiliser and has environmental benefits.

“**Quality assessment** and process management of **organic fertilisers and compost** by NIR is also gaining interest.”

“Environmental applications in general, involving the sampling and **testing of manure, slurries, sewage, lake sediments and other biosolids** for nitrogen, other nutrients and even metals are an important new field for NIR.”

Vad mäter man med NIR inom lantbruk?

- **Analys av mjölk- och mejeriprodukter**

“Milk composition can now be tested on-line during milking, for fat and protein, and dairy products such as powdered milk, butter and cheese are routinely analysed on-line in dairy factories — not just for gross composition but also for sensory properties, texture, ripening and process control.”

- **Ullkvalitet**

“Estimation of wool quality was one of the first NIR applications ever attempted, but there have been many problems, especially with raw or greasy wool. The New Zealanders have conducted a lot of research on scoured wool, and measurements of properties like residual grease and colour are now routine. Some studies have shown that NIR prediction of fibre diameter and yield in greasy wool is possible. Discrimination of components of wool-textile blends has also been found to be successful.

Vad mäter man med NIR inom lantbruk?

- **Analys av fisk- och kycklinfiléer**

NIR is used to measure **pigmentation in live farmed salmon**, and the important food safety development in which hyperspectral imaging is used to detect **faecal contamination** of poultry carcasses on the killing chain.

- **Oliver och olivolja**

NIR is firmly established as a reliable method to assess the **quality of olives and detect adulteration of olive oil**.

Vad mäter man med NIR inom lantbruk?

- **Kvaliteten på frukter och grönsaker**

”A major NIR application is the **quality assessment of intact fruit**. **Soluble solids** (mainly sugars measured as °Brix), **starch**, **acidity**, **detection of internal defects and sensory properties** can be determined, and **on-line quality sorting** of fruit is being adopted.”

- **Analys av jordmån**

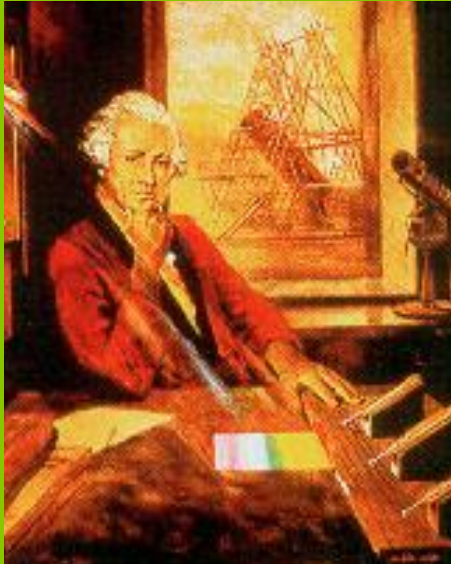
”**Soil analysis** and **mapping** and **discrimination of soil types** by NIR, particularly for carbon, nitrogen and anions is becoming more common.”



Tidslinje för analys av tomater med NIR

William Herschel

Upptäckte NIR ljuset



1800

Första frukt applikationerna

Färg och skavanker med hjälp av synligt ljus

1960-och tidigt 70-tal

1985

Första NIR applikationen

Torrhalten i lökar

Första on-line applikationen

Världens första fruktsorteringsmaskin enligt sockerhalten (Brix) för äpplen och persikor med tunna skal ("sweetness guaranteed fruit"), 3 frukter/sekund/instrument

1989

1998

Torrhalten och Soluble Solids
Concentration (SSC) I kiwifrukt
(Japan)

Vision

Professor McClure visionerade
att vi framtiden kommer att ha
instrument som liknar pennor
för att mäta kvaliteten på mat

1999

2005

Tomat textur (Firmness), SSC and acidity

Nondestructive Determination of Tomato Fruit Quality
Characteristics Using Vis/NIR Spectroscopy
Technique (Y. He, Zhejiang University, Hangzhou,
China)

Lycopene and beta-carotene

Determination of Lycopene and beta-Carotene Content in Tomato Fruits and Related Products (M. Baranska, Poland)

2006

2007

First handheld NIR application? SSC and Moisture content

Evaluation of Tomato Quality on Tree and after Harvesting using Portable NIR Spectroscopy (T. Kusumiyati, United Graduate School of Agricultural Sciences, Japan)

First NIR imaging application?

Detection of Cracks on Tomatoes Using a Hyperspectral Near-Infrared Reflectance Imaging System (Korea)

2014

137 publications including “NIR” and “Tomato”

Prediction of firmness parameters of tomatoes by
portable visible and near-infrared spectroscopy
(China and USA)

2018



Future

- Better, smaller and cheaper instruments
- Precision agriculture
- IoT, Cloud services and Big Data
- Integration



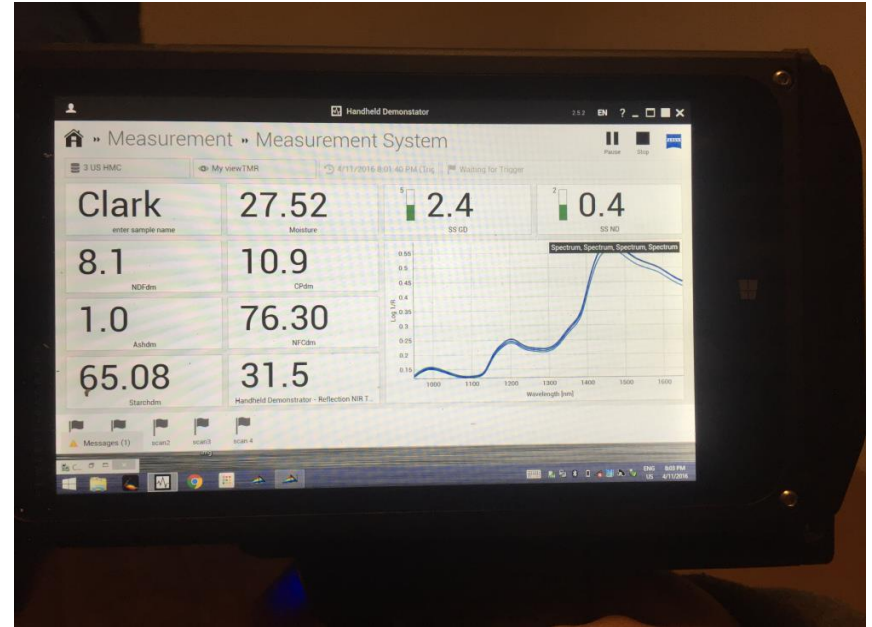
KNOW WHEN TO PICK 'EM

Measure your crops for moisture, acid, and more. Brimrose helps farmers and artisans know when is the best time to harvest.

[Request Info](#)



Bärbar NIR analysator för boskapsuppfödare.
Realtidsanalys av kvalitet på ensilage, TMR och
andra foder.





NIR Spectroscopy: Out Of The Lab And Into Your Pocket

By Ed Biller, Editor

Consumer Physics' SCiO is a handheld spectrometer that empowers users to gather instant feedback on the chemical make-up of materials around them. The device uses a no-touch optical sensor to gather information and the data is sent, via Bluetooth, directly to the user's smartphone, a system that allows for the product's miniature size.



Much as Tribogenics miniaturized X-ray technology to improve its accessibility to consumers, Consumer Physics has miniaturized near-infrared (NIR) spectroscopy to scan physical materials. In just a few moments, the device can compare a scanned object to a database of physical objects to see if the subject fits within a signature of previously identified objects.

Consumer Physics CEO Dror Sharon said he and company co-founder Damian Goldring evaluated other sensor technologies for consumer use, but settled on NIR spectroscopy as a technology that could be miniaturized and cost-efficient when used in tandem with a smartphone.

"You have a smartphone ecosystem with about 1 to 1 1/2 billion smartphones made a year, which means you've got billions of optical sensors being designed and built in a year, and that gave us the comfort level [to] come up with a design and technology that can leverage that engineering," Sharon said.



SCI0 Tomato Selector

5 632 visningar

32 2 DELA ...



SCI0 - Consumer Physics
Publicerades den 31 juli 2016

PRENUMERERA 2,3 TN

Use SCI0 to pick the sweetest, most nutrient dense tomatoes.

Results are provided in BRIX degree units. BRIX is a measure of total nutrient density including all

The world's first material sensing smartphone



CHANGHONG H2

Material Sensing Smartphone

powered by



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Name

First

Last

Email

CHANGHONG



Always pick
the best

<https://www.youtube.com/watch?v=CPPfatkXx74>

4.1.2017

Tomato parameters measured by **NIR**

- Sugars (Brix)
- Glucose and fructose
- Citric and malic acid
- Soluble Solids Content (SSC)
- Fruit firmness
- pH
- Acidity
- Lycopene
- Beta-carotene
- Separation between transgenic and non-transgenic tomatoes
- Moisture content
- Color
- Tomato Color Index (TCI)
- Tomato maturity
- Classification of tomatoes with different genotypes
- Vibration levels (damage degree)
- Separation of mold contaminated from fresh

