Quality control tools for pea protein production to promote the local and circular economy

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Introduction

The production of plant proteins for human and animal consumption has become a priority in Europe. In Wallonia, the development of local agri-food chains, which are profitable for the entire chain and allow for total and circular value creation, is focused on the plant protein sector. In this context, the development of "pea protein" production is an interesting diversification opportunity that needs to be promoted.

Within the WALOPEA project, CRA-W worked on analytical methods that can be performed both in a laboratory and on-site (field or warehouse) to improve the quality control of the pea crops, enhance their valorisation and reduce material losses.

Results

1. Determination of the protein content using NIRS

Protein content values of 152 samples determined with a XDS (Foss), a near infrared (NIR) reference spectrometer, were used to develop the NIR calibration model on the portable spectrometer Neospectra (Si-Ware Systems). Currently, the model continue to be improved with new data but already give accurate predictions of the total protein content of peas.

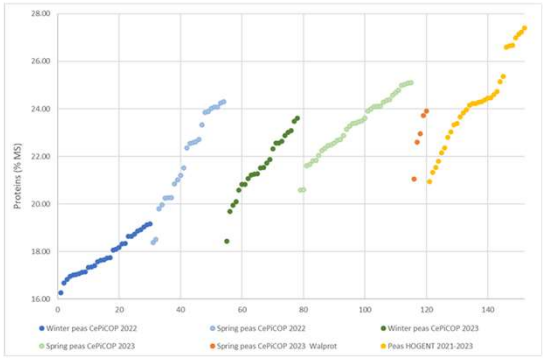

Figure 1 : Protein content values (in % of dry matter) of 152 samples used to build the model on the Neospectra (Si-Ware Systems)

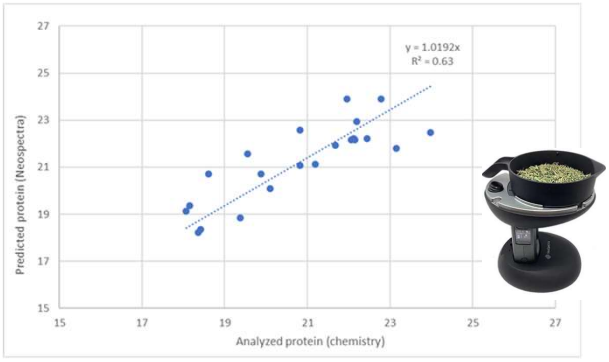

Figure 2 : Protein content prediction (in % of dry matter) with the Neospectra (Si-Ware Systems) on a validation set of 22 samples

2. Presence of undesirable substances

Contaminations by mycotoxins, mainly during storage, or allergens during transport can affect the quality of peas. Two commercial lateral flow immunochromatographic assays detecting ochratoxin A and soy have been tested.

2.1. Ochratoxin A detection

The *Reveal® Q+ Max for Ochratoxin* (Neogen) was not validated for use with peas. The protocol had to be adapted to avoid variable absorption of buffer by pea flour.

Figure 3 : Reveal® Q+ Max for Ochratoxin A and Raptor Reader

Results obtained with the kit on entire peas were validated by comparison with those obtained on the same samples using a home-made mass spectrometry method.

Samples	Reveal Q+ Max OTA	MS results
Sample 1	~ 0 ppb	~ 0 ppb
Sample 2	~ 5 ppb	~ 7,5 ppb
Sample 3	~ 12 ppb	~ 20 ppb
Sample 4	~ 5 ppb	~ 4,5 ppb
Sample 5	very high levels	> 750 ppb

Figure 4 : Comparison of results obtained with Reveal® Q+ Max for Ochratoxin A and by mass spectrometry

2.2. Detection of soy contamination

Pure soy seeds and pea samples with different soy contents (between 1 and 0.1% in mass fraction) were prepared and analyzed with the *Reveal® 3-D for Soy* (Neogen).

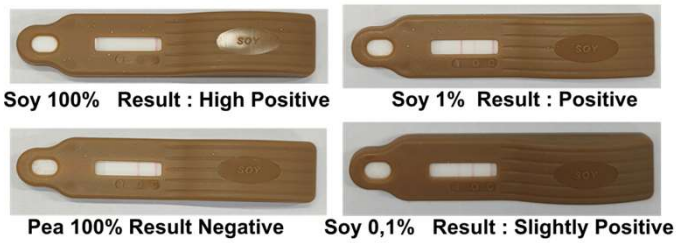

Figure 5 : Semi-quantitative results obtained with Reveal® 3-D for Soy

All the results obtained are consistent with those expected and corroborated by the analyzes carried out by PCR.

Conclusions and perspectives

The tested methods make possible to carry out analyzes easily without requiring expensive laboratory equipment and to deliver reliable results in a very short time.

These analytical tools should help to foster the pea protein production and improve the quality of the final product.

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