

# OA1. Single-Grain Analysis Technique for Selection of High Protein and Oil in Soybean Breeding Lines Using NIRS

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**Objectives :** The objectives of this research were to study the potential non-destructive NIR spectro-computer system to estimate the protein and oil con of intact single-grain soybean and to provide the efficient mass screening tech for selection of high protein and oil lines in early soybean breeding programs.

## **Materials and Methods :**

Soybean samples : 160 soybean germplasms

Chemical analyses : Auto-kjeldahl and soxhlet systems

Near infrared analysis : NIRSystem 6500 monochrometer NIRS(408~2492nm)

Calibration and validation : Using the WinISI program, *Calibrate* and *Monitor*

Calibration method : MLR, MPLS and PCR, Sample Module : Horizontal(Single-gra

**Results :** The 96 and 86 soybean samples were used for non-destructive single-g NIRS equation development of protein and oil, respectively and the total of 45 an soybean sample sets were used for prediction of developed single-grain protein an NIRS equations. In the developed NIRS equations, the most accurate non-destru single-grain NIRS equation condition of protein and oil was obtained respectively 4, 4, 1 and 2, 1, 10, 10 (Mathematical derivative, Gap size, First smoothing poin Second smoothing point) math treatment condition with SNVD (Standard Normal Var and Detrend) scatter correction method and entire spectrum (408~2492nm) by using (Multiple Linear Regression). The most accurate NIRS equations for the prediction protein content in single-grain soybean were showed high coefficient of determin ( $R^2$ ) 0.955 and low standard error of calibration(SEC) 0.459 with a kjeldahi-determ sample mean of 41.5% and range of 35.3~48.5%. In the case of oil, SEC was and an  $R^2$  of 0.920 with a soxhlet-determined sample mean of 20.0% and range of ~22.9%. Validation of these NIRS equations showed very low bias (Protein : 0.10 Oil : 0.209%) and standard error of prediction (SEP, Protein : 0.415%, Oil : 0.281% high coefficient of determination ( $r^2$ , Protein : 0.967, Oil : 0.945). Therefore, non-destructive single-grain NIRS equations seem to be reliable for determination protein and oil contents of intact soybean seed, and non-destructive single-grain technique could be used as a mass screening method for selection of high protein and oil lines in early soybean breeding programs.

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