

Determination of Total Nitrogen Contents in Fresh Rice Leaf using the Visible and Near Infrared Spectroscopy System

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Objectives

To development of measurement method on nitrogen content in fresh rice leaf by omission of drying and pulverization course. Therefore, this technique will be apply to nutritive diagnosis.

Materials and Methods

○ Materials

- Varieties : Dongjin1ho etc. (31varieties: early, medium, mid-late maturing variety)
- Cropping pattern : Transplanting culture
- Sampling : Iksan, Buan, Joungup
- Transplanting date : 30 May
- Seeding date : 30 April
- Planting space : 30×15cm
- Sample collection : 6 July, 12 July, 19 July, 26 July

○ Methods

- Make out equation : NIR Model - 6500
Program version - WinISI 1.5
PLS (Partial least square)
Math treatment - 1, 4, 4, 1

Results and Discussion

- The spectrum of various sample collected for compare variation according to location and make out validation test. This result showed that nitrogen content average value of rice plant, 1-VR, SECV value were similar in all location.
- Bias, Slope and R^2 value after outlier treatment were higher than before outlier treatment, but Standard Deviations, SEP and SEP(C) value were low. Also AVE. Global H value showed not a clear tendency. SED(D) Limit and Bias Limit value were unchanged.

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Table 1. Results of validation test for determining total nitrogen content by Partial Least Squares method in different rice groups.

Groups	No. of Sample	Mean	Range	SEC	1-VR	SECV
A	150	3.583	2.58 ~ 4.47	0.156	0.832	0.193
B	101	3.229	2.37 ~ 4.04	0.173	0.878	0.199
C	116	3.748	2.91 ~ 4.80	0.170	0.813	0.206

Table 2. Outlier identification for bias, slope, R^2 , S.D. and SEP value by Partial Least Squares method in fresh rice leaves.

Groups	Outlier treatment	Bias	Slope	S. D.	SEP	No. of Sample	R^2
A	Before	-0.004	0.997	0.477	0.166	153	0.878
	After	0.000	1.000	0.471	0.152	150	0.896
B	Before	-0.011	1.01	0.491	0.184	103	0.858
	After	-0.000	1.00	0.484	0.168	101	0.878
C	Before	0.004	0.953	0.473	0.202	120	0.819
	After	0.001	1.001	0.479	0.165	116	0.880

S.D.: Standard Deviations

Table 3. Outlier identification for SEP(C), global H and bias value by Partial Least Squares method in fresh rice leaf.

Groups	Outlier treatment	SEP(C)	Means	SED(C) Limit	AVE. Global H	Bias Limit
A	Before	0.167	3.572	0.250	0.885	0.116
	After	0.152	3.583	0.250	0.997	0.116
B	Before	0.185	3.215	0.258	0.977	0.119
	After	0.169	3.229	0.258	0.977	0.119
C	Before	0.202	3.751	0.268	1.033	0.124
	After	0.116	3.746	0.268	1.020	0.124