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Use of Near-Infrared Analysis for the Evaluation of Proximate Nutrients of Finger Millet (*Eleusine coracana L.*)

By

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Thesis submitted to the University of Sri Jayewardenepura as the partial fulfillment requirement for the award of the degree of Masters of Science in Food Science and Technology.

Department of Food Science and Technology

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Declaration

The work describe in this thesis was carried out by me as partial fulfillment of the requirement for the degree of Masters in Food Science and Technology under the supervision of Prof. Arthur Bamunuarachchi, Mr. Jagath Wansapala, Department of Food Science and Technology, University of Sri Jayawardenepura and Dr. (Mrs.) P. N. Dasanayaka, Department of Botany, University of Sri Jayawardenepura and a report on this thesis has not been submitted in whole or in part of any University or any institute for another degree.

22/08/2008 .....

Date

(Sajeewani Waruni Ranawaka)

We certify that the above statement made by the candidate is true and this thesis is suitable for submission to the University for the purpose of evaluation.

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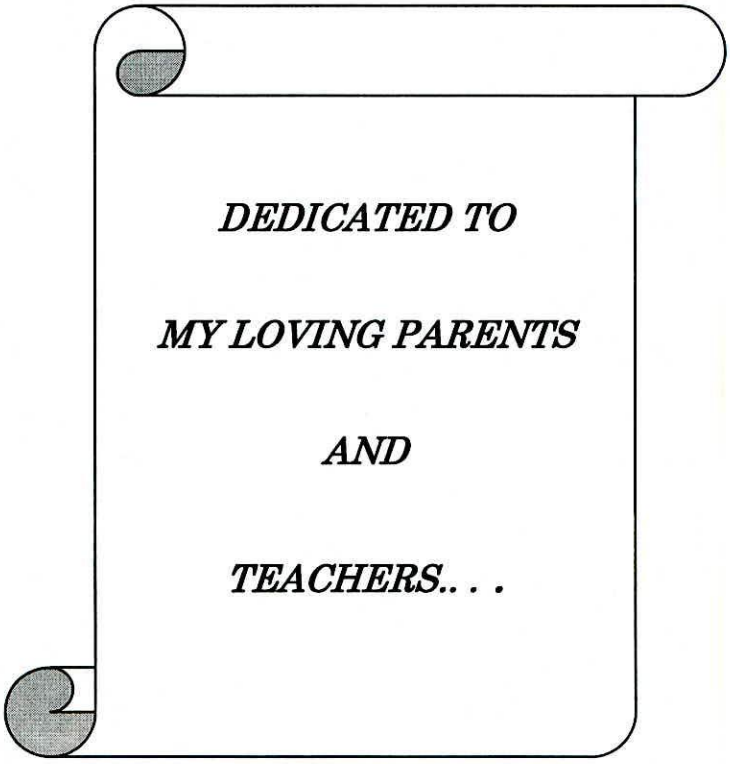
DEDICATED TO
MY LOVING PARENTS
AND
TEACHERS.. . .

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List of Abbreviations

NIR	-	Near- Infrared Reflectance
Nm	-	Nanometers
PGRC	-	Plant Genetic Resources Center
ICRISAT	-	International Crop Research Institute for the Semi-Arid Tropics
RARS/AK	-	Regional Agricultural Research Station Agonakolapalassa
d.b.	-	Dry basis
w.b.	-	Wet basis
N	-	Number of Calibration Samples
$\overline{X}$	-	Mean value of the Reference data
$\overline{Y}$	-	Mean value of the NIR predict data
SEP	-	Standard error of performance
SD_x	-	Standard deviation of reference values
SD_y	-	Standard deviation of NIR predicted values
RPD	-	Ratio of SEP to SD_x
r	-	Coefficient of correlation
b	-	Regression coefficient
a	-	Regression intercept
R^2	-	Coefficient of determination
VR	-	Variance

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ABSTRACT

Near Infrared Reflectance spectroscopy (NIR) is a sophisticated and accurate analytical technique for rapid determination of nutrient composition. The purpose of this study was to develop calibration models using NIR reflectance spectroscopy for determination of the Proximate Nutrients of finger millet grains. The morphologically different finger millet samples were selected as the calibration sets. Grains were grinded into fine particles by using Retsch Mill with 500 μm screen size. NIR (1100 nm - 2500 nm) reflectance spectra for all those samples were obtained. The reference data were analyzed using conventional methods; Micro Kjeldahl method, forced-Air Oven method, Werner Schmid method, Dry ashing and the method of crude fiber determination. A mathematical relationship was developed between spectral data and analytical data. The application of multivariate calibration algorithms and statistical methods were used to evaluate the efficiency and accuracy of the calibrated models by means of a validation set. These calibrated models generated excellent prediction results. R^2 values of moisture, protein, fibre and ash were 95.4 %, 98.7 %, 94.9 % and 91.0 % respectively while SEP value for those models were 0.1719, 0.1925, 0.1561 and 0.1435 respectively. These results led to the conclusion that developed NIR models can be used for accurate proximate analysis of finger millet grains.