

Comparison between traditional methods and biospeckle for the determination of humidity in soybeans

Talita Fredericci*, Juliana A. Fracarolli, Rosa H. Aguiar, Pâmela S. Betin.

Abstract

This research project aims to determine and compare three different methods for the determination of the humidity in samples of soybeans (*Glycine max*). For that, the method of humidity acquisition through oven at atmospheric pressure, the infrared method, and Biospeckle through the calculation of the normalised Moment of Inertia (MI) were used.

Key words:

Glycine max, Humidity, Biospeckle.

Introduction

The oven method at atmospheric pressure, the infrared method, and the Biospeckle method were compared as to the measurement of the water content.

Three levels of bean moisture content were assessed, at 11, 33, and 50% water content. The water content in one product is related to the biochemical and physical changes which occur in the beans during storage. It is also related to the activity of microorganisms, activation of enzymes, and metabolic processes which change the biological tissue of the bean. An accurate determination of the water content allows for the decision making in activities such as aeration, drying, cooling, inter-bin transfer, and other activities performed in order to ensure the maintenance of the stored bean quality.

This method is an innovating proposal, for, unlike the traditional methods, it does not change the bean physically or chemically. Besides, it has a fast response and does not generate polluting residues.

Results and Discussion

With the help of the software Sisvar¹ version 5.3, the Tukey's test was performed at 5% precision which showed that the MI averages statistically differ among themselves at the 3 used moisture contents.

Figure 1. Normalised values of the acquired moisture content through the Infrared method (IV), Oven at atmospheric pressure, and Moment of Inertia (MI).

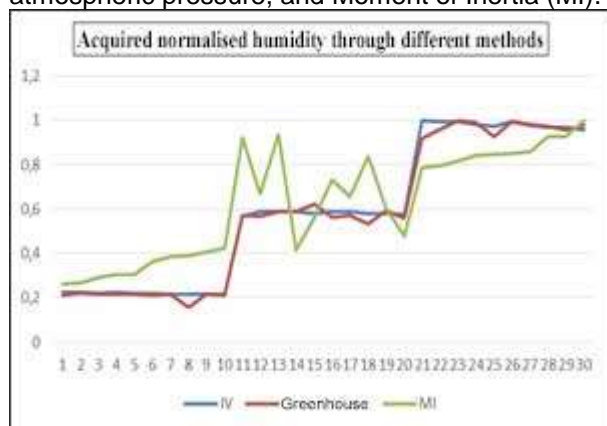


Table 1. Tukey's test at 5% probability.

MI Averages	Results	Theoretical Moisture content (%)
0.872171	A1	11
1.201203	A2	30
1.317047	A3	50

Legend: A1, A2, and A3 represent the 11, 30, and 50% moisture contents respectively

The traditional methods produced similar results differing less than 10% between the samples' average, since both are designated destructive methods when obtaining moisture content, and are based on the difference of mass to acquire the result.

The oven method at atmospheric pressure was used as a base, since it is the most accurate method for the determination of the water content.

Conclusions

It is possible to observe that the Biospeckle allows for the determination of the samples' moisture content. However, the calculation of the moment of inertia presents a high coefficient of variation (7.18%). For an accurate reading of the moisture content values, it is necessary to carry out further experiments so that the MI values may be converted into moisture content values of the samples.

Acknowledgement

I mainly acknowledge the sponsorship of CNPq in this research, Professor Juliana A. Fracarolli, who has supported me throughout the work, and Rosa Helena.

¹ FERREIRA, D. SISVAR software: versão 5.3. Lavras: DEX/UFLA, 2003. Disponível em: <<http://www.dex.ufla.br/~danielff/software.htm>> Acesso em: 15 nov. 2010.