EVALUATION OF LIPOXIGENASE ACTIVITY IN COMMON BEANS BY NMR AND UV SPECTROSCOPY

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Keywords: *Lipoxigenase, Bean storage, NMR, UV*

Abstract

Lipoxygenase enzymatic activity study by UV and NMR demonstrated that the activity is directly related to storage time.

Introduction

Oxidative rancidity is an important process of food spoilage caused by enzymatic oxidation of lipids[1]. This process can change flavor and color, and lipoxygenases are the most responsible for this[1]. There are several studies for lipoxygenase activities in soybean, however, little is known about the activity of this enzyme in beans. In this context, we use NMR and UV to evaluate the lipoxygenase action in five bean cultivars: Madrepérola, BRS Estilo, CNCF, BRS Pontal and Pinto Beans, stored in different time and temperature conditions. This information will be used to define the best conditions for beans storage.

Results and Discussion

UV analyses demonstrated that enzymes have your activity increased with course of time. The highest activities were: BRS Estilo > Madrepérola > Pinto Beans > CNFC > BRS Pontal. On the other hand, the storage in different temperatures influenced only Madrepérola > Pinto Beans > BRS Pontal.

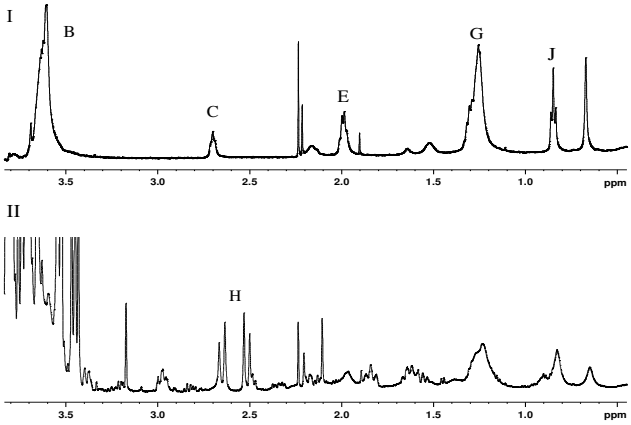

Figure 1. [1]H NMR of linoleic acid pure (I) and after 5 minutes of enzime activity (II). Linolenic acid (C) and citric acid (H).

NMR data demonstrated that increasing of enzyme activity results in decreasing of fatty acids content. This is in agreement with UV analyses. NMR spectra, Figure 1, demonstrated that diallylic signal (C) of linolenic acid have disappear after 5 minutes of lipoxygenase action. We can also percept new signals demonstrating some degradation products, like citric acid (H). This information was corroborated by HR-MAS NMR analyses of *in natura* bean grains where fatty acid contents decrease during storage time, as can be seen in Figure 2.

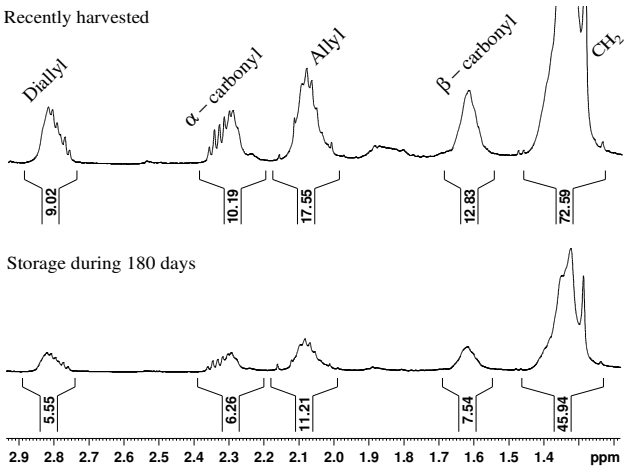

Figure 2. [1]H HR-MAS NMR of *in natura* bean grains, highlighting fatty acid contents.

Conclusion

Lipoxygenase enzymatic activity study by UV and NMR demonstrated that the activity is directly related to storage time. Decreasing of fatty acid contents, observed on NMR spectra, corroborated the consumption of fatty acid by enzymatic activity.

Acknowledments

The authors are grateful to CAPES, CNPq, FAPEG and FINEP for scholarship and financial support.

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