

Raman spectroscopic study of rice globulin

S.W. Ellepola^a, S.-M. Choi^b, D.L. Phillips^c, C.-Y. Ma^{b,*}

^a*Institute of Fundamental Studies, Hantana Road, Kandy, Sri Lanka*

^b*Food Science Laboratory, Department of Botany, The University of Hong Kong, Pokfulam Road, Hong Kong, China*

^c*Department of Chemistry, The University of Hong Kong, Pokfulam Road, Hong Kong, China*

Received 4 May 2005; revised 22 June 2005; accepted 28 June 2005

Abstract

The conformation of rice globulin was studied by Fourier-transform Raman spectroscopy as influenced by different buffer environments and heat treatments. The Raman spectrum of the native protein showed a predominance of α -helical structures as indicated by major amide I and III bands at 1657 and 1270 cm^{-1} , respectively. Highly acidic and alkaline pH conditions induced band shifts and intensity changes in amide I, amide III, and C-H (bending and stretching) vibrations, indicating protein denaturation. Addition of dithiothreitol and β -mercaptoethanol led to changes in S-S stretching vibration, whereas ethylene glycol and urea caused marked changes in tryptophan, tyrosine Fermi doublet and C-H band intensities. Heating at 100 °C resulted in progressive denaturation as indicated by band shifts and intensity changes of major spectral regions. Our results revealed that hydrophobic interactions and disulfide bonds play a major role in stabilizing the conformation and in thermal aggregation of rice globulin.

© 2005 Elsevier Ltd. All rights reserved.

Keywords: Raman spectroscopy; Rice globulin; Protein conformation.
