PROTEINS AS DELIVERY SYSTEMS OF CINAMIC ACID

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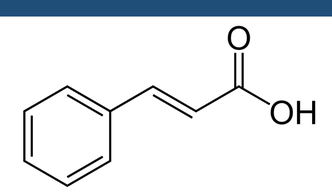
INTRODUCTION

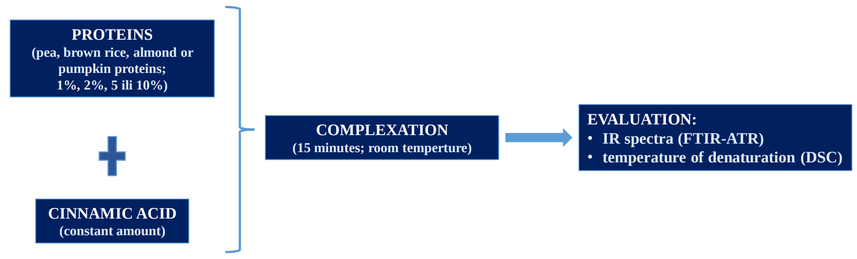
Natural sources such as proteins and phenolic acids have been extensively studied for their nutritional properties since they are considered important components of a balanced diet. Next to nutritional features, some of these compounds especially phenolic acids have proven their efficiency as antioxidant agents. Phenolic acids can be unstable thus their binding with proteins can be valuable and efficient tool of their preservation. Binding of phenolic acids on proteins causes structural changes of proteins as well as changes of some protein properties.



Cinnamic acid

OBJECTIVES

- **Different type of proteins are often used for formulation of delivery systems of phenolic compounds. In this study four types of proteins were used: brown rice and pea powder (with 80% of proteins) and pumpkin and almond powder (with 50% of proteins).**
- **Encapsulates were formed by complexing pea proteins, brown rice proteins, almond proteins or pumpkin proteins in different amounts (1%, 2%,5%, 10%) with constant amount of cinnamic acid.**
- **The main goal of this work was to investigate the structural changes that occured on proteins after encapsualtion with cinnamic acid. For that puprose FTIR-ATR and DSC analysis were performed.**

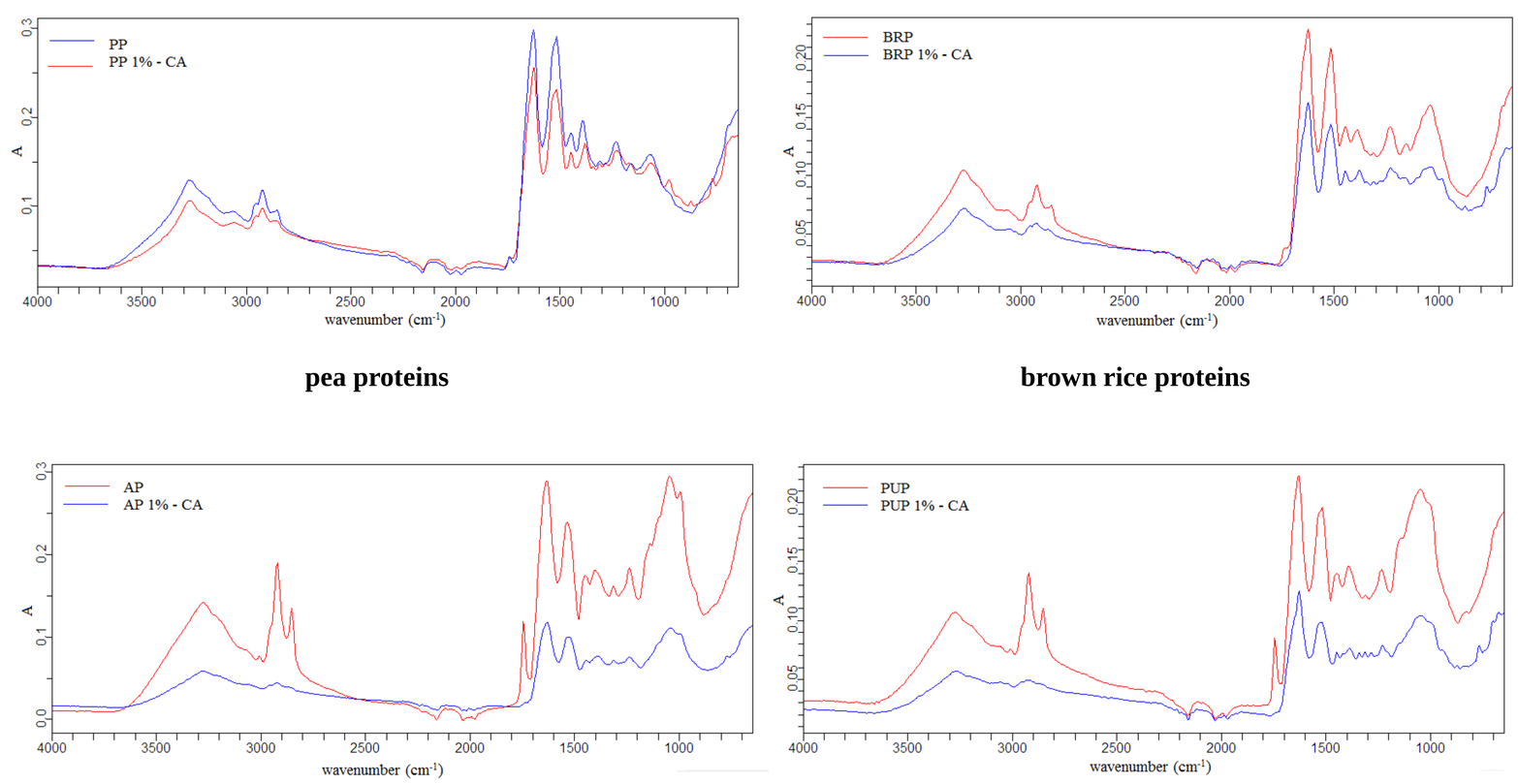


RESULTS

Denaturation temperature (T_d) of proteins and protein-cinnamic acid complexes

Samples (amount of proteins)	T_d
Pea proteins	
100%	88.60 ± 0.47[a]
PP (1%) – CA	85.15 ± 0.39[c]
PP (2%) – CA	85.26 ± 0.44[c]
PP (5%) – CA	85.66 ± 0.38[c]
PP (10%) – CA	86.88 ± 0.33[b]
Brown rice proteins	
100%	85.26 ± 0.25[a]
BRP (1%) – CA	81.34 ± 0.34[b]
BRP (2%) – CA	81.53 ± 0.17[b]
BRP (5%) – CA	81.64 ± 0.08[b]
BRP (10%) – CA	81.75 ± 0.22[b]
Almond proteins	
100%	85.24 ± 0.07[d]
AP (1%) - CA	88.18 ± 0.08[a]
AP (2%) - CA	87.19 ± 0.20[b]
AP (5%) - CA	86.73 ± 0.12[b,c]
AP (10%) - CA	86.38 ± 0.36[c]
Pumpkin proteins	
100%	87.44 ± 0.27[a]
PUP (1 %) - CA	85.11 ± 0.25[c]
PUP (2 %) - CA	86.13 ± 0.47[b]
PUP (5 %) - CA	86.30 ± 0.34[b]
PUP (10%) - CA	86.69 ± 0.39[b]

CA - cinamic acid; PP - pea proteins; BRP - brown rice proteins; AP - almond proteins; PUP – pumpkin proteins; 1-10% - protein content during complex preparation ; T_d- denaturation temperature (amounts marked with different letters in each protein groups are statistical different)



pea proteins | brown rice proteins | almond proteins | pumpkin proteins

IR spectra of proteins and protein-cinnamic acid encapsulates

(CA - cinamic acid; PP - pea proteins; BRP - brown rice proteins; AP - almond proteins; PUP – pumpkin proteins; 1% - protein content during complex preparation)

CONCLUSIONS

- ✓ **Complexation of proteins with cinnamic acid was proved throughout FTIR and DSC screening.**
- ✓ **Almond/cinnamic acid complexes had higher denaturation temperature then almond protein (1 to 3 °C) while other three complexes had lower denaturation temperature then correspondent protein. For pumpkin/cinnamic acid complexes decrease of denaturation temperature was 2 °C, while for other two from 3 to 4 °C.**
- ✓ **Structural changes of encapsulates in comparison to protein were detected by screening with FTIR-ATR. Intensity of peaks decreased in comparison to proteins and additional peaks on complexes were detected. Changes on IR spectra were more pronounced when lower amounts of proteins were used for complexation with cinnamic acid.**

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