

INVESTIGATION OF ENZYMATIC EFFECT ON ISOLATION OF PROTEINS FROM AGRICULTURAL WASTE

Tea Sedlar, Jelena Čakarević and Ljiljana Popović

Tehnološki fakultet, Bulevar Cara Lazara 1, 21101 Novi Sad, Srbija

OBJECTIVES:

The first objective of this study was to adjust enzyme-assisted method for effective extraction of proteins from cauliflower and broccoli leaf waste. The second objective was to characterize physical and functional quality of obtained proteins in order to determine their potential utilization in food industry.

METHOD/DESIGN:

Enzyme assisted extraction:



Cauliflower leaves

Broccoli leaves

Enzymatic pretreatment:

10h, pH 4,5, 35°C,
Viscozyme®L and Vinozyme® used in three different enzyme to substrate ratio (E/S) 0.2%, 2.5% and 4.8%

Alcaline extraction:

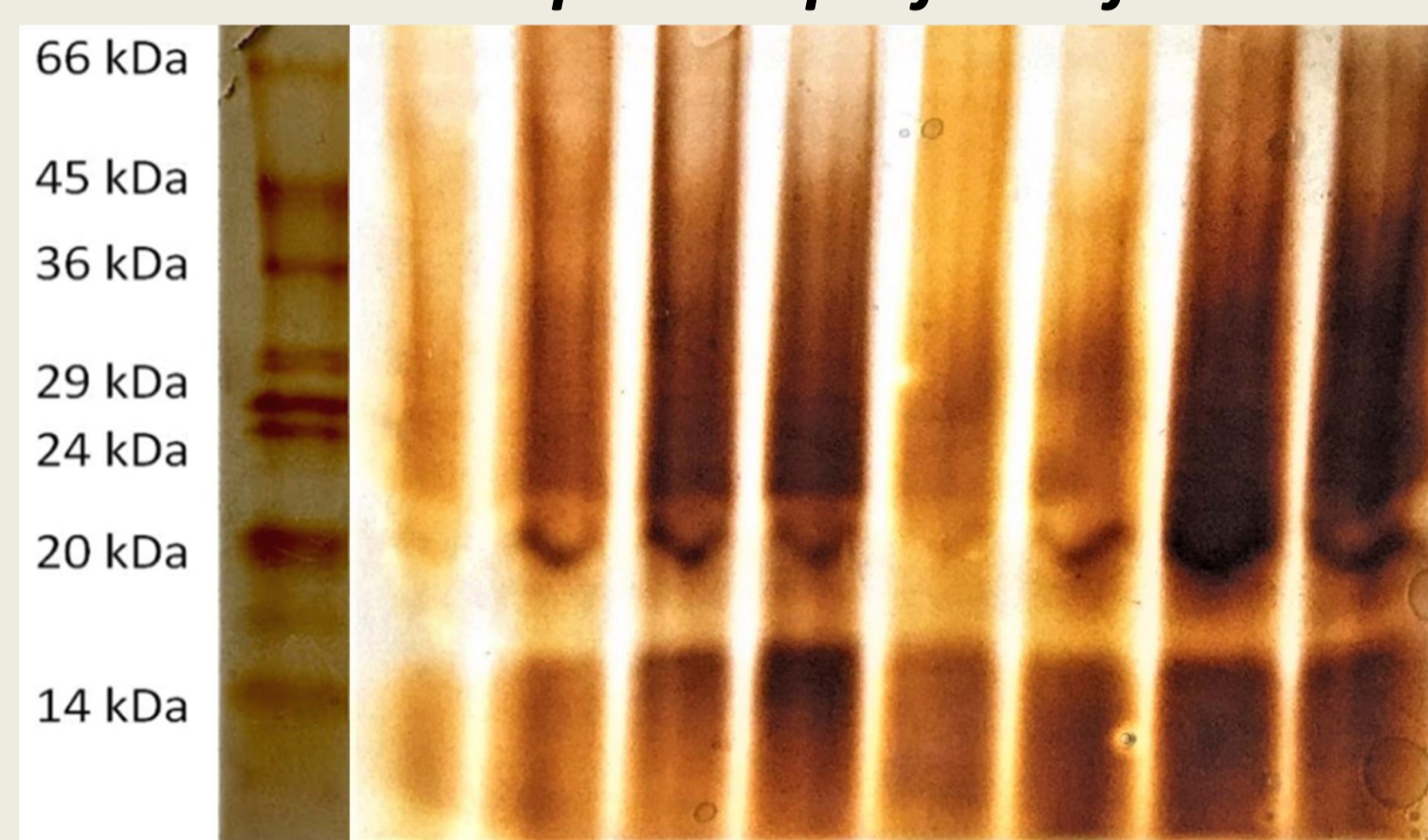
1M NaOH, pH 10-11, 30 min, room temperature

Filtration
Supernatant

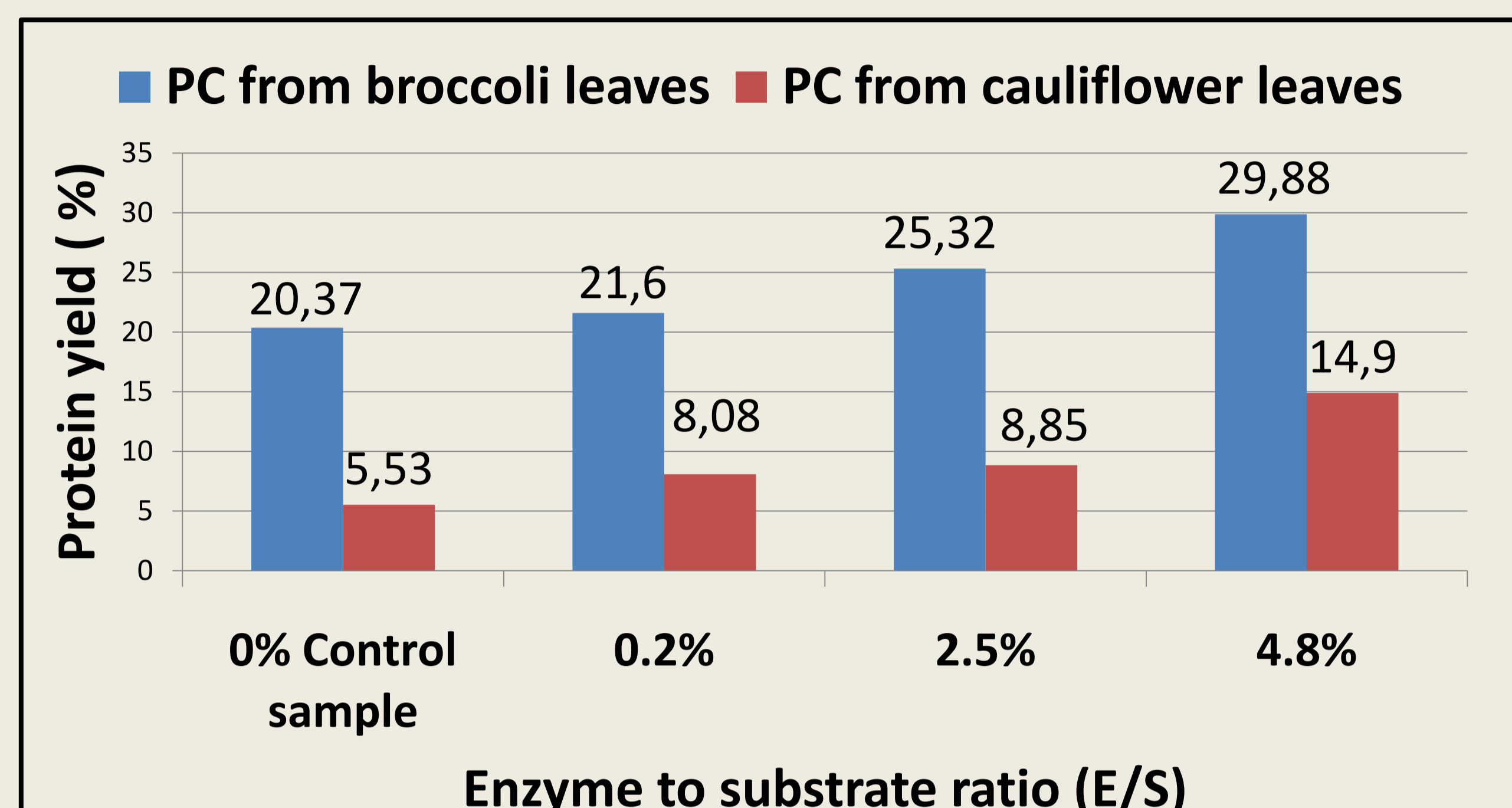
Isoelectric precipitation, pH 4;
centrifugation,
drying at room temperature;

PROTEIN CONCENTRATES

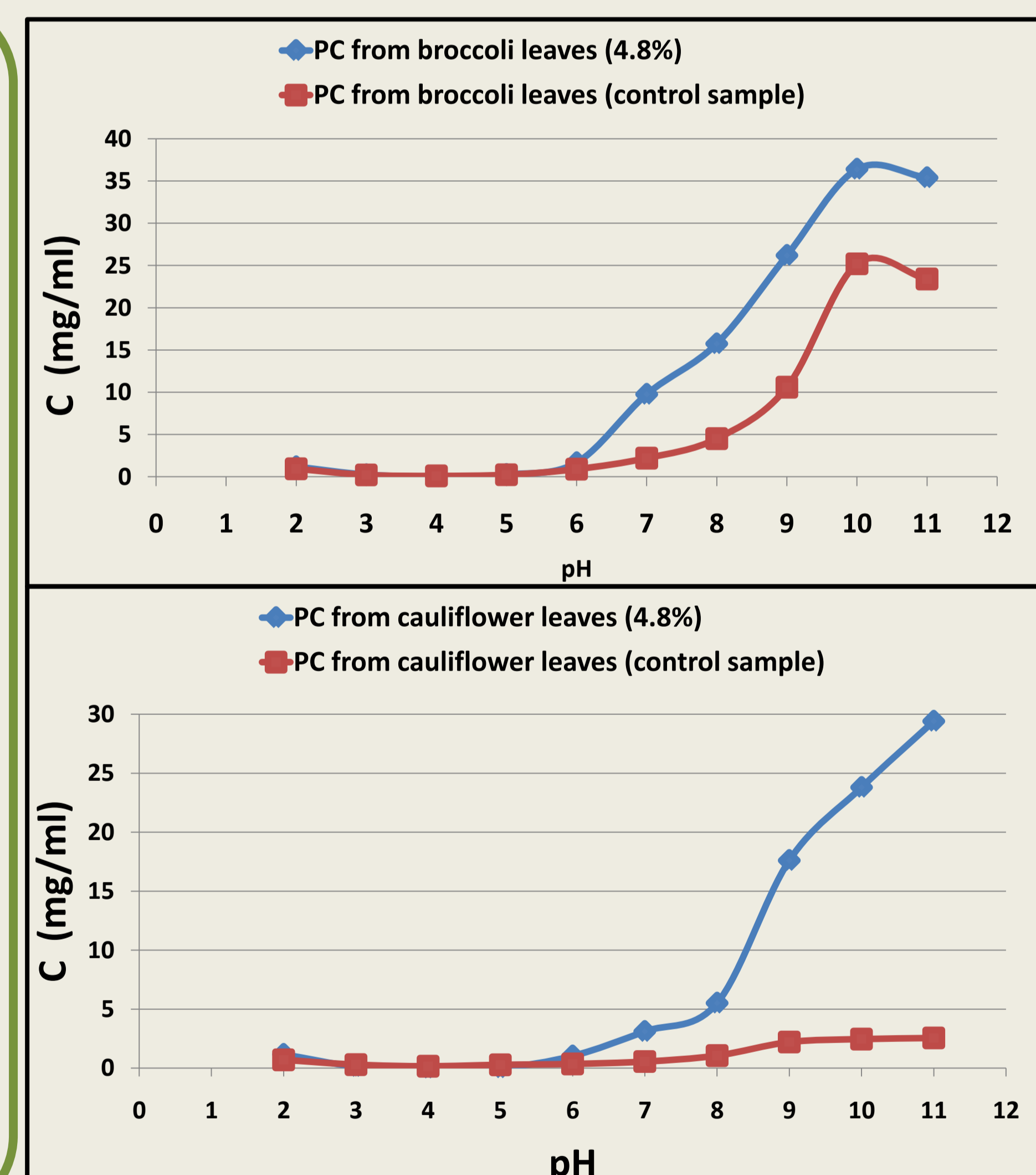
SDS-PAGE protein profiles of PCs



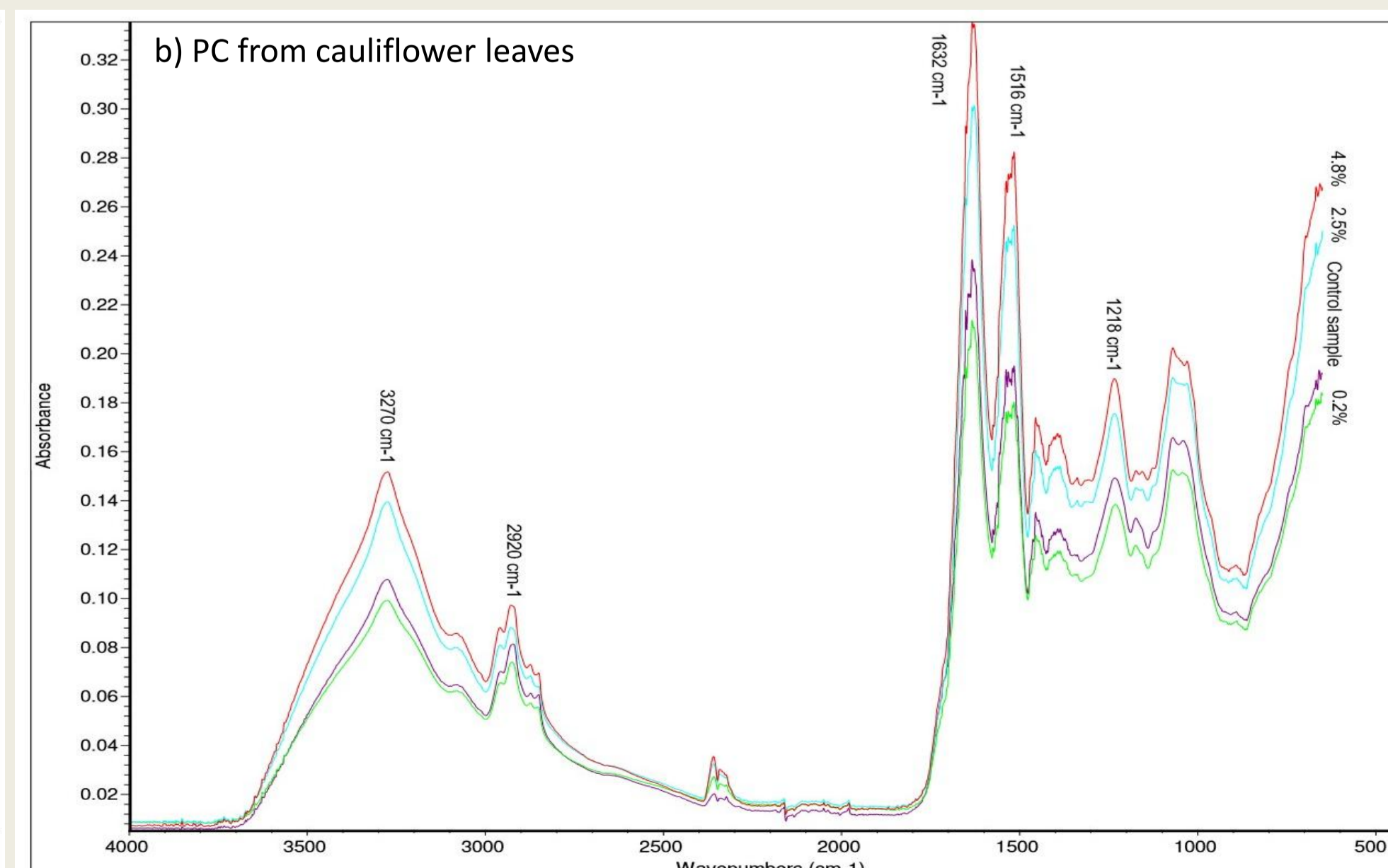
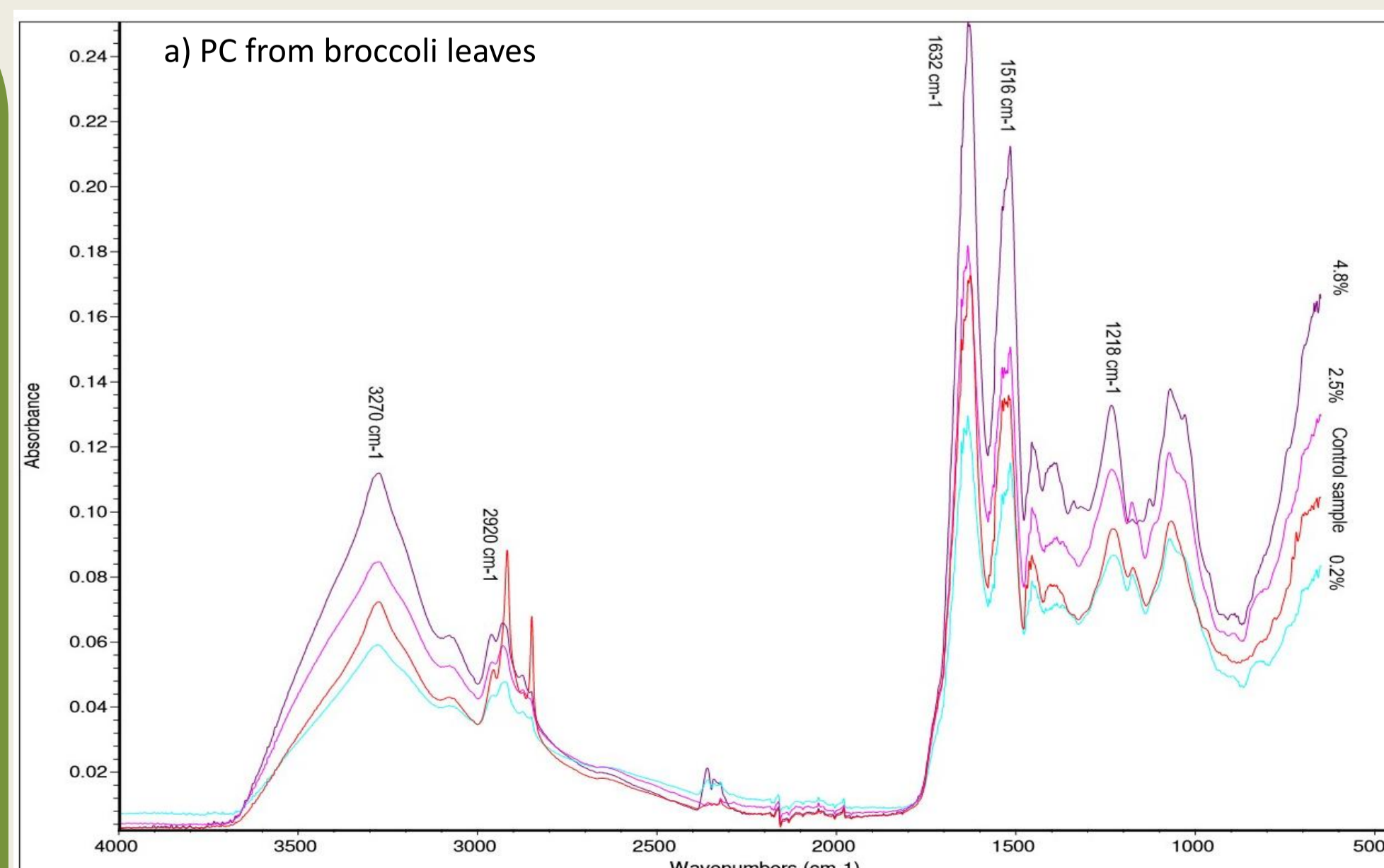
RESULTS:



The solubility profile of all protein samples was characterized by low solubility in acidic environment (pH 2 - pH 6) with a linear increase in alkaline environment (pH 8 - pH 11). The highest solubility for the enzymatically pretreated sample of cauliflower leaves was achieved at pH 11 (29.4 mg/ml) and it was 25% higher compared to the control sample. In the case of broccoli, the highest solubility was achieved at pH 10 (36.4 mg/ml) and was also improved in comparison with the control sample.



FTIR spectroscopy is an efficient technique used to assess the secondary structure of a protein. The characteristic infrared absorption band of proteins obtained from waste leaves of broccoli and cauliflower mainly includes amide A band (3270 cm⁻¹), amide B band (2920 cm⁻¹), amide I band (1632 cm⁻¹), amide II band (1516 cm⁻¹), and amide III band (1218 cm⁻¹). As the amount of enzyme complex increased, the characteristic peaks of the amide A, amide B, amide I, II, III bands showed higher absorption numbers.



CONCLUSIONS:

Enzyme-assisted extraction leads to a significant increase in the yield of extracted proteins. Moreover, solubility of these proteins was significantly improved within alkaline pH values. Therefore, it can be expected that the improved solubility can potentially affect the improvement of other functional properties, thereby increasing the potential of these proteins as future food ingredients.