

## Introduction

Causes of huge plant protein consumption are vegetarian food habits, food practice because of cultural and spiritual belief, less microbial contamination and motivation for less calorie intake with better protein quality. Nutritional quality, yield and techno-functional properties of the protein depend on the extraction process. Novel extraction technologies like ultrasound assisted extraction, microwave assisted extraction, deep eutectic solvent extraction and reverse micelles extraction would provide higher yield, purity and better physicochemical and techno-functional properties of the protein.

## Objective

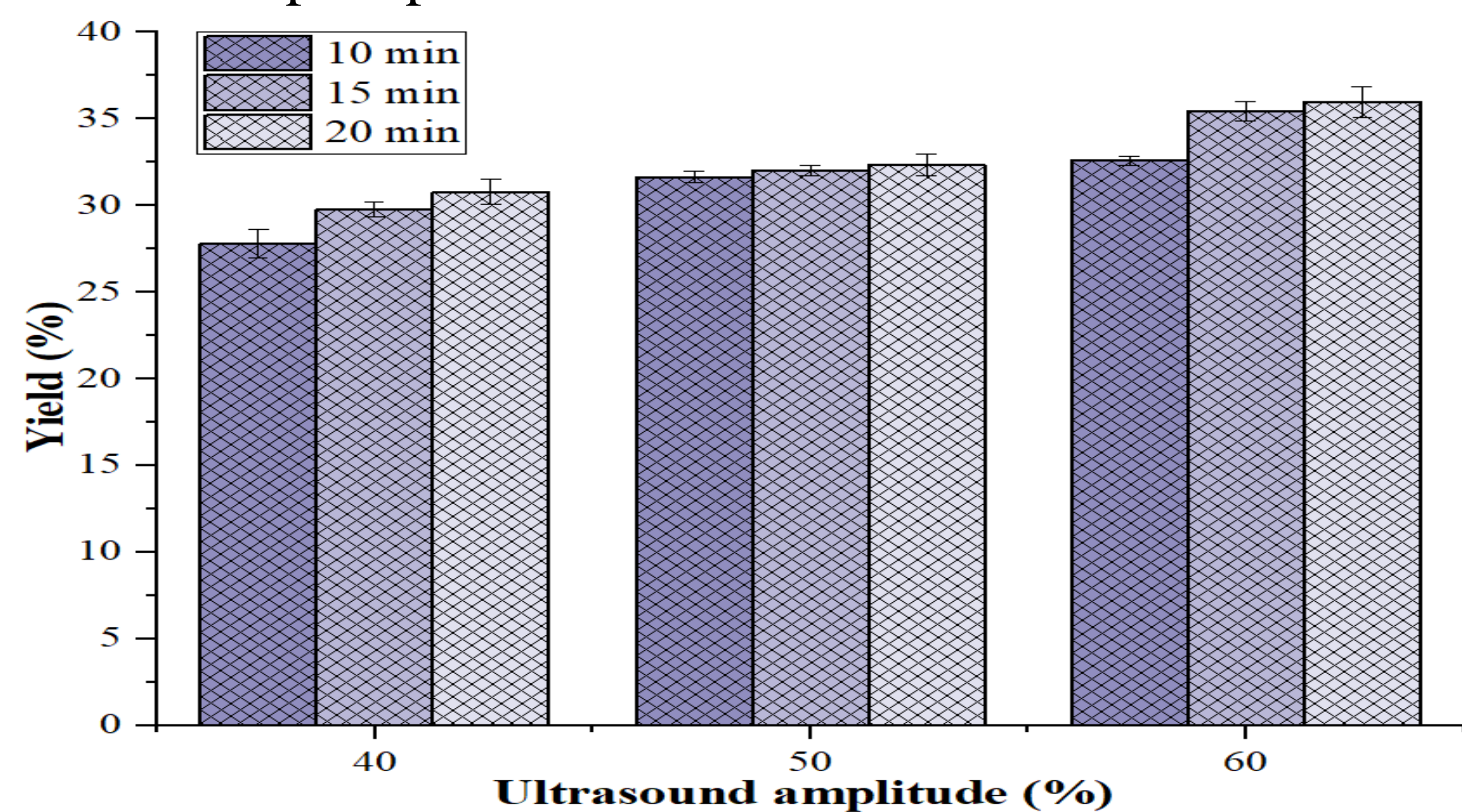
Extraction and characterization of protein from Deccan hemp seed (DHS) by conventional and ultrasound assisted methods (US).

## Methodology

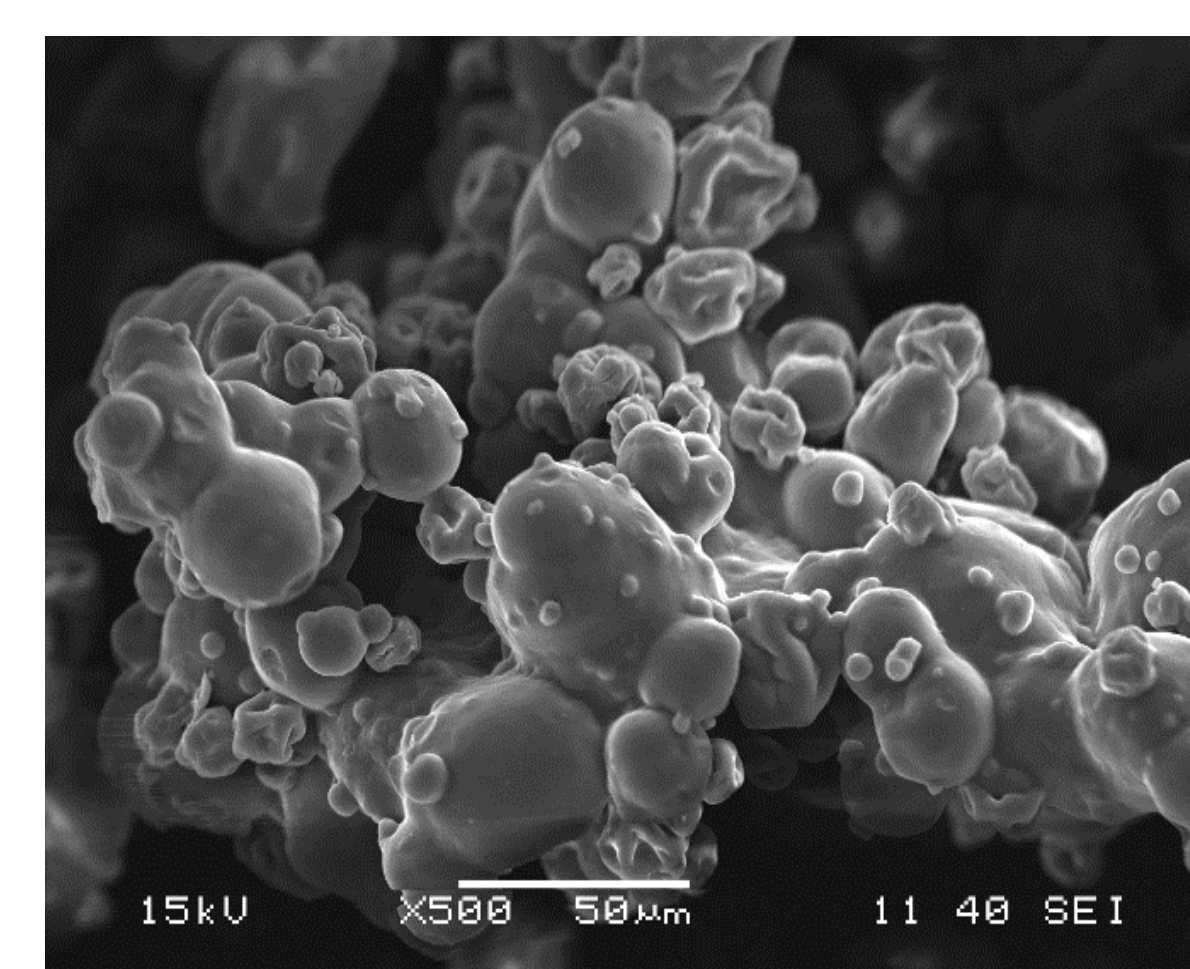
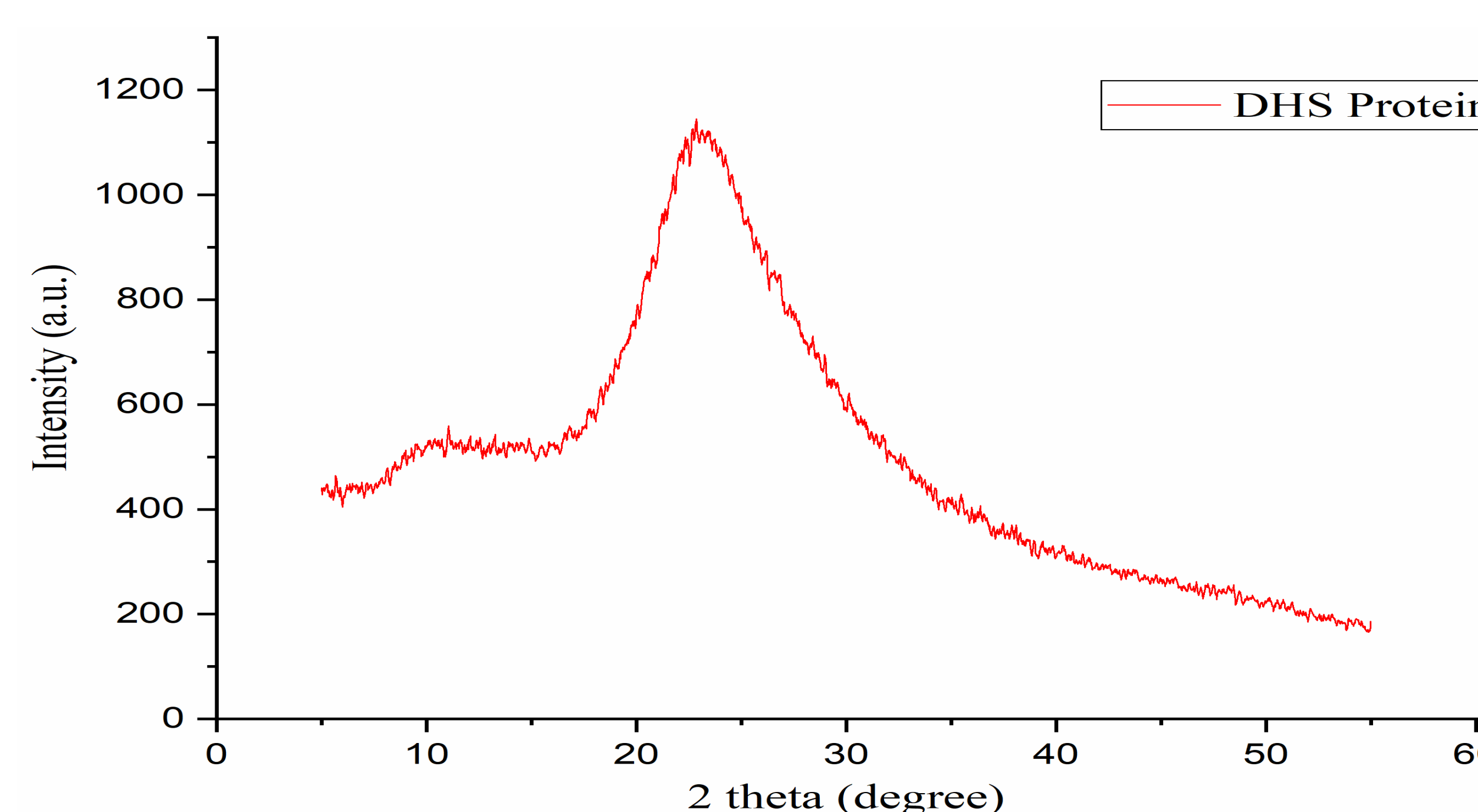
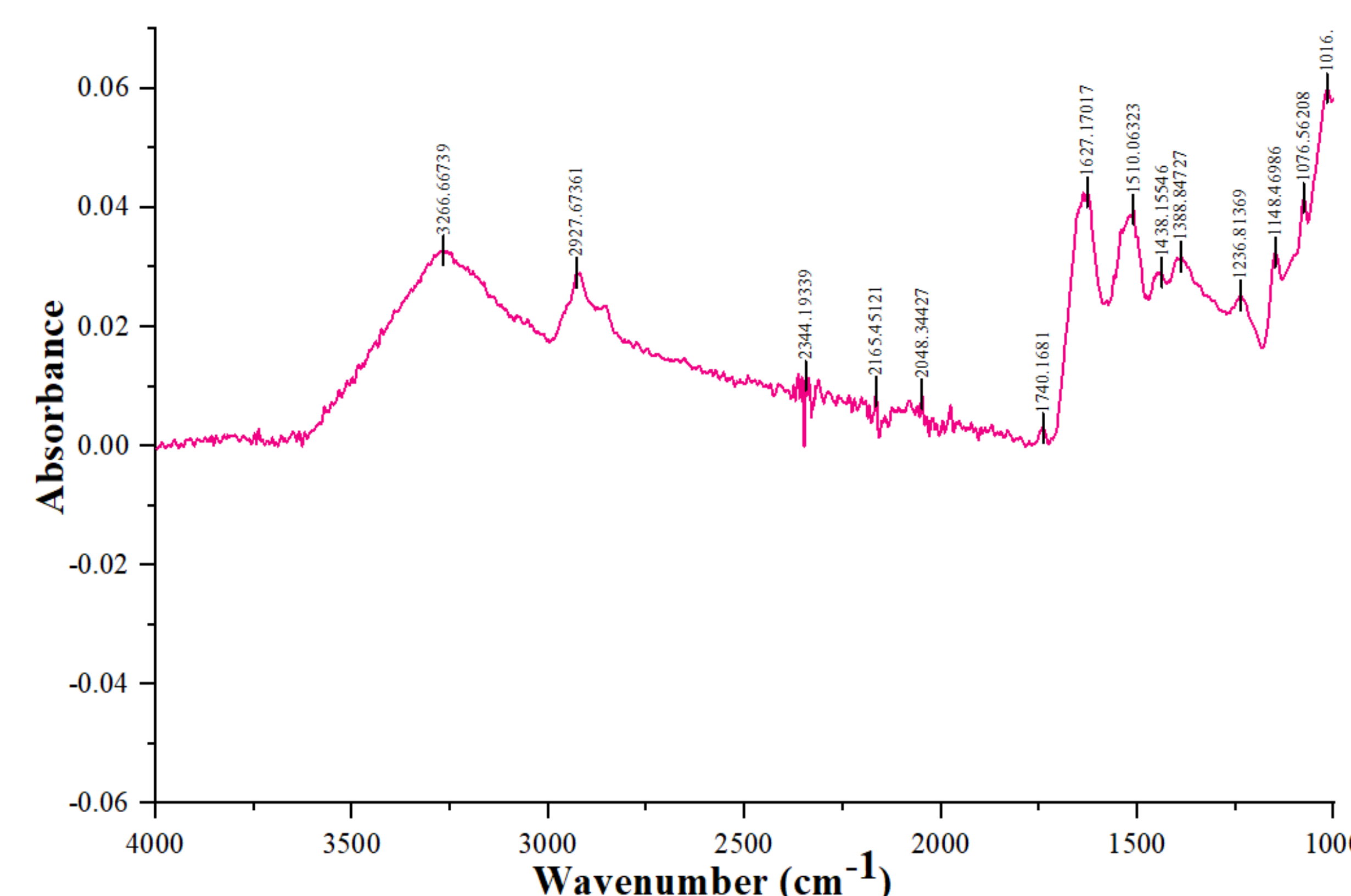
The protein from the defatted DHS flour was extracted by isoelectric precipitation and ultrasound methods under different conditions of pH (9-11), solvent to flour ratio (15-25 mL/g) and temperature (30-50 °C), US power or amplitude (40-60%) and US time (10-20 min). The structural, physicochemical, and functional properties of the developed protein were determined and analysed.

## Results and Discussions

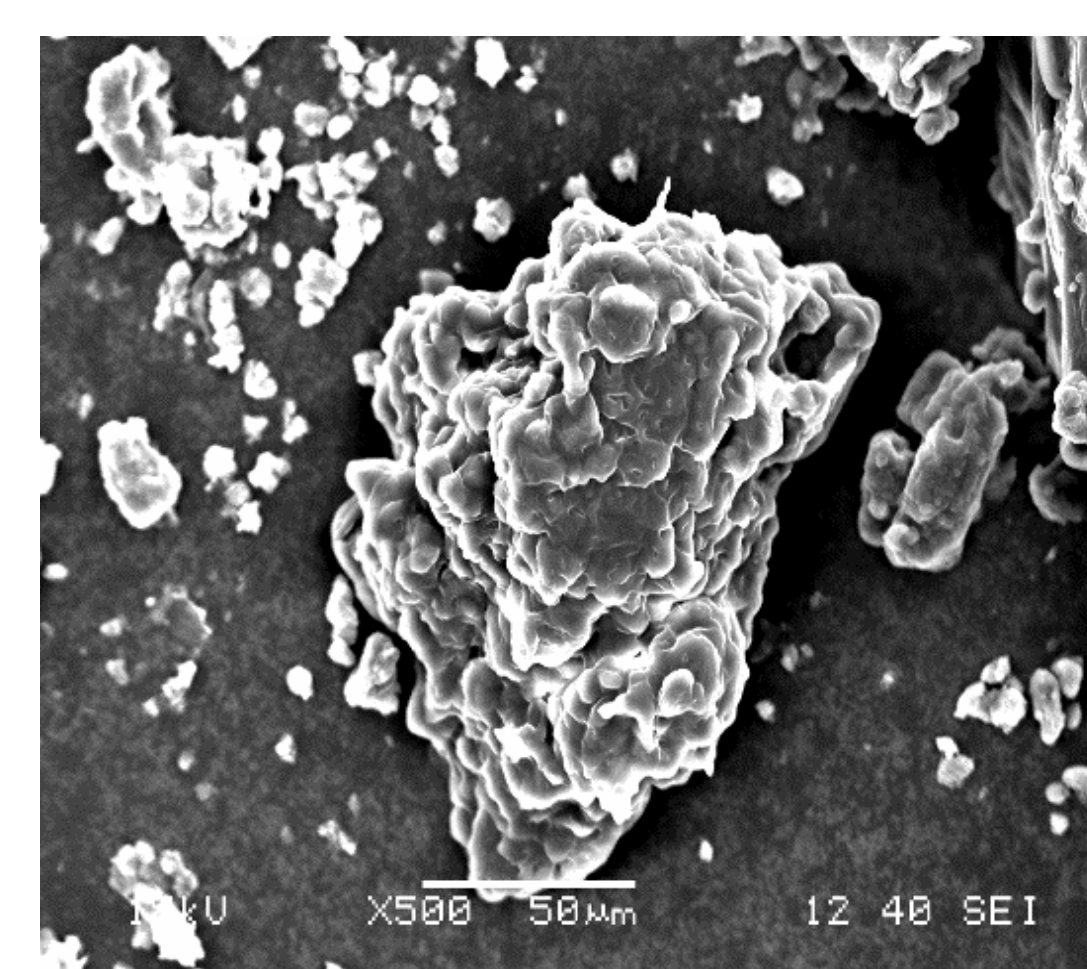
Maximum yield and purity of 24.57% and 76.05% of DHS protein were obtained at 50 °C extraction temperature, 20 mL/g solvent to flour ratio and solubilisation pH of 9 in isoelectric precipitation method.



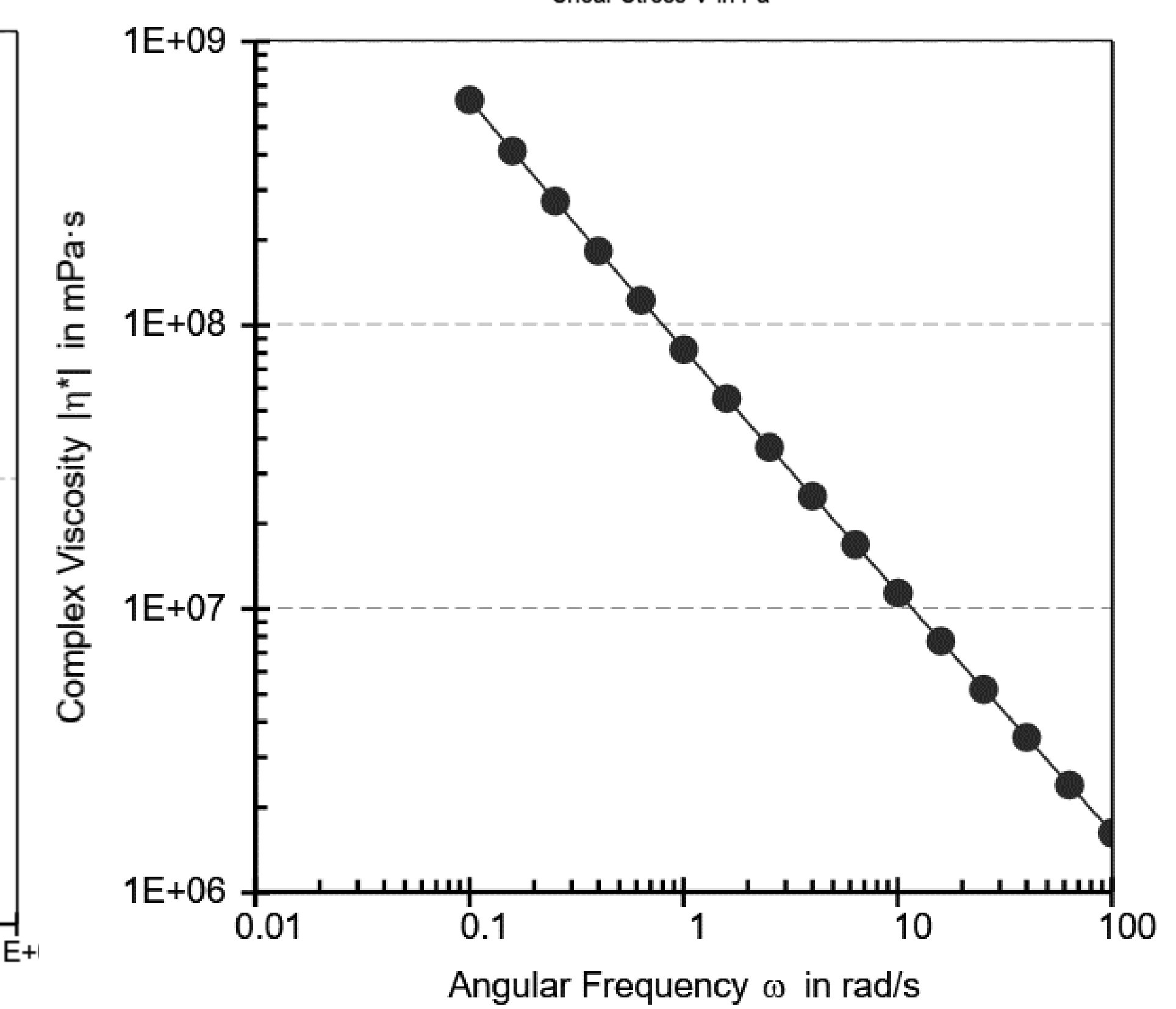
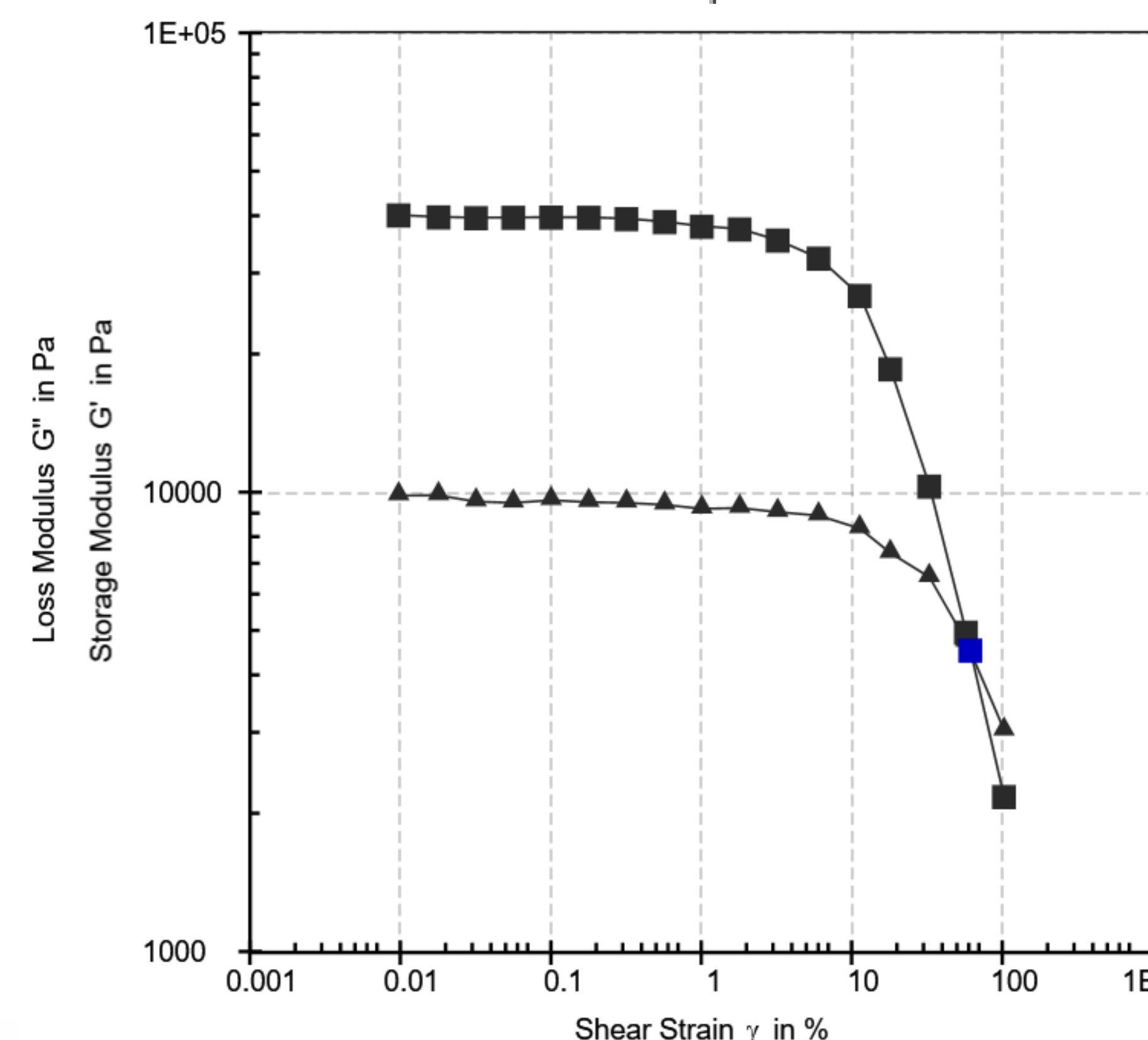
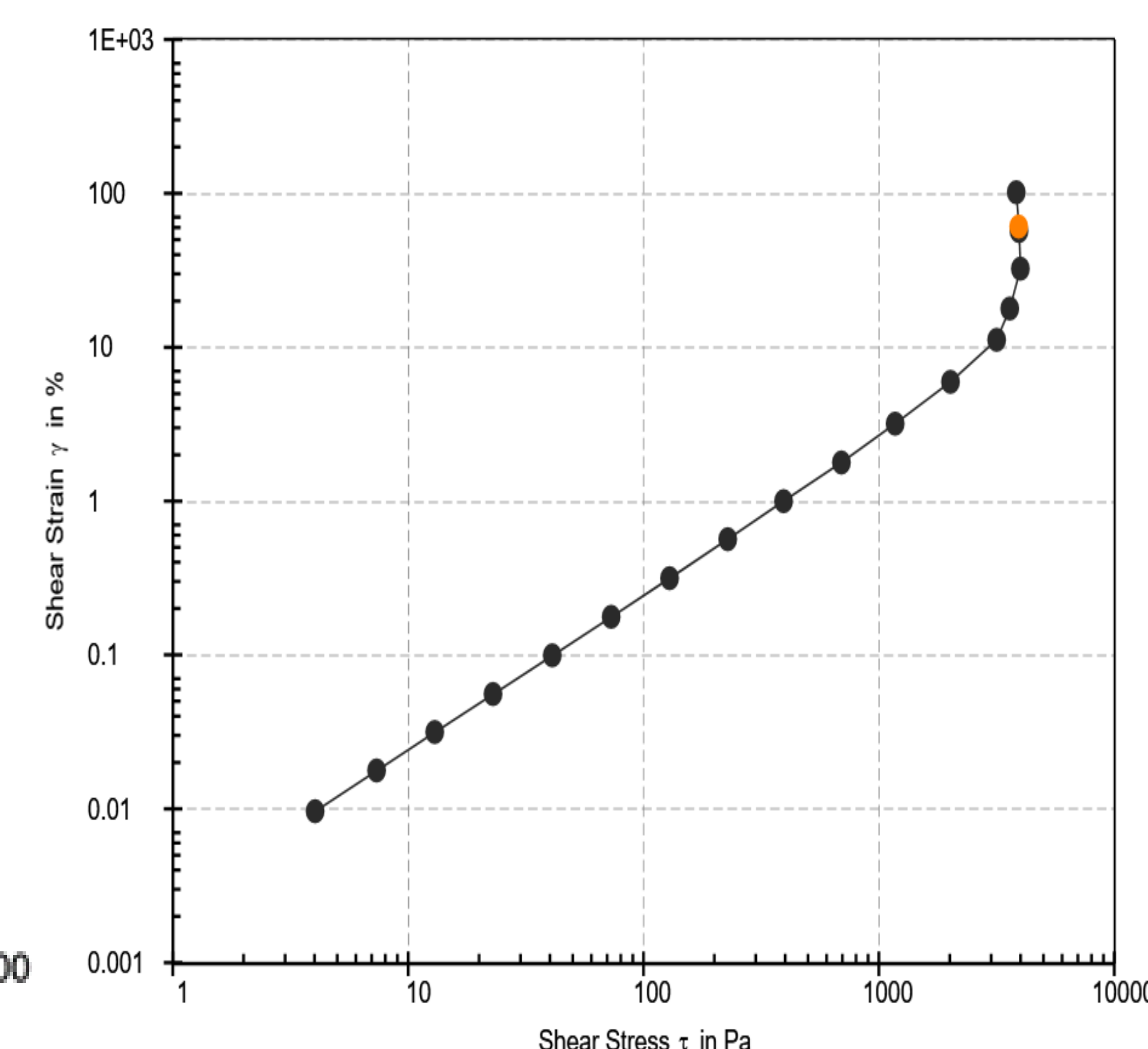
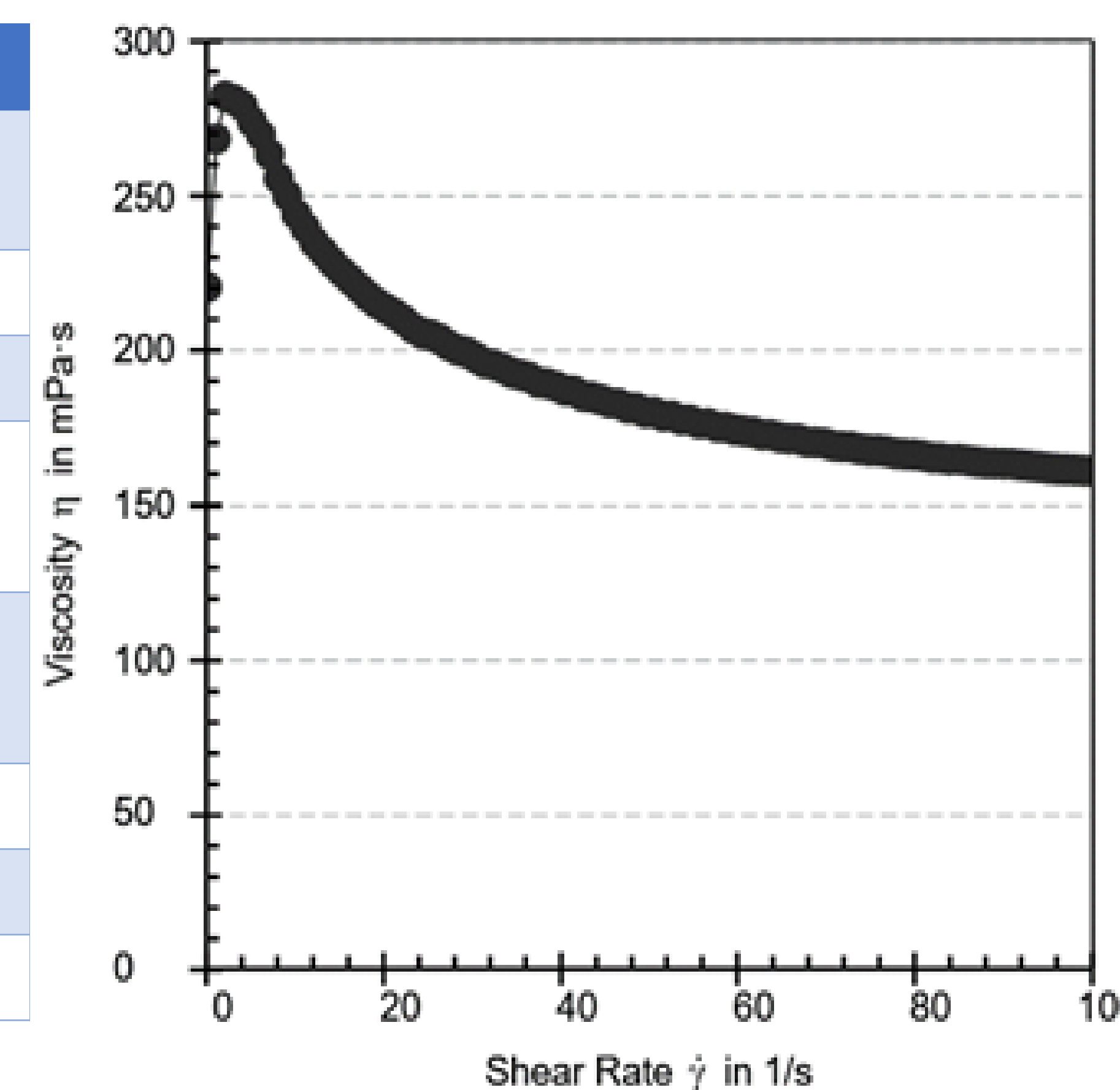
Parameter	Extraction technique	
	Conventional	Ultrasound assisted
Extraction yield (%)	24.57 ± 0.09	35.98 ± 0.18
Purity (%)	76.05 ± 0.67	85.15 ± 0.39
Water holding capacity (g/g)	2.75 ± 0.12	3.39 ± 0.11
Oil holding capacity (g/g)	3.10 ± 0.11	3.87 ± 0.17
Foaming capacity (%)	102.50 ± 4.33	123.50 ± 4.09
Foaming stability (%)	65.36 ± 2.40	85.81 ± 2.64
Emulsion capacity (%)	58 ± 0.31	66 ± 0.23



Defatted powder



Protein powder



## Conclusion

Ultrasound assisted extraction of DHS protein improved the yield and purity. The ultrasound assisted extracted protein showed better functional, physicochemical and structural properties. DHS protein can be used as a potential ingredient for the production of functional and health promoting foods.

## References

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# **Extraction and characterization of protein from novel plant-based sources**

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## **Abstract**

The objective of the work is to extract and characterize the protein from Deccan hemp seed (DHS) by conventional and ultrasound (US) methods. The protein from the defatted DHS flour was extracted by isoelectric precipitation and ultrasound methods under different conditions of pH (9-11), solvent to flour ratio (15-25 mL/g) and temperature (30-50 °C), US power or amplitude (40-60%) and US time (10-20 min). The structural, physicochemical, and functional properties of the developed protein were determined and analysed. The pH, solvent to flour ratio, extraction temperature, US power and US time showed significant effect on the yield of the protein. The maximum yield of conventionally extracted protein was obtained to be 24.57% at the condition of pH 9, solvent-flour ratio of 20:1 and extraction temperature of 50°C. Ultrasonication treatment at 60% amplitude and 20 min duration produced a maximum protein yield of 30.50%. The structural components of the protein were studied by using Fourier transform infrared spectroscopy. The microstructure and crystallinity of the protein were investigated by examining the scanning electron microscopy images and X-ray diffractograms. The study showed US assisted method improved yield, functional, physicochemical and structural properties of DHS protein. DHS protein can be used as a potential ingredient for the production of functional and health promoting foods.

**Keywords:** Plant protein, Isoelectric precipitation, Ultrasound, Functional property