

Effects of drying techniques on the physicochemical, functional, thermal, structural and rheological properties of mung bean (*Vigna radiata*) protein isolate powder

ABSTRACT

Mung bean is an inexpensive yet sustainable protein source. Current work compared the effects of freeze (FD), spray (SD) and oven drying (OD), on mung bean protein isolate (MBPI) produced on pilot scale. All samples showed no dissociation of protein subunits and were thermally stable ($T_d = 157.90\text{--}158.07\text{ }^{\circ}\text{C}$). According to morphological studies, FD formed a porous protein while SD and OD formed wrinkled and compact crystals, respectively. FD and SD formed elastic gels with better gelling capacity than OD (aggregated gel). FD showed exceptional protein solubility, water and oil absorption capacity (4.23 g/g and 8.38 g/g, respectively). SD demonstrated the smallest particle size, excellent emulsion activity index (29.21 m²/g) and stability (351.90 min) and the highest β -sheet amount (37.61%). FTIR spectra for all samples showed characteristic peaks which corresponded well to the secondary structure of legume proteins. Rheological analysis revealed that gelation temperature for all MBPI lied around 90 $^{\circ}\text{C}$. Current work described the different final properties achieved for MBPI produced under different drying techniques that allowed tailoring for different food systems, whereby FD is ideal for meat extender, SD is suitable for meat emulsion while OD is suitable in general protein-based application.

Keyword: Functional properties; Mung bean; Pilot scale extraction; Protein characterization; Sustainable food