Nutritional Quality, Fatty Acids, Amino Acids and Functional Characteristics of Bael (Aegle marmelos L.) Seed Protein Concentrate

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ABSTRACT

Studies were carried out on bael (Aegle marmelos L.) seed protein concentrate (BSPC) to evaluate the proximate, mineral and amino acid composition, nitrogen extractability and functional properties. The protein content was found to be 70.8 g/100 g BSPC. Calcium and phosphorus were observed in major quantities. The bael seed meal (BSM) lipid is found to be rich in unsaturated fatty acids (75%). Essential amino acids occurred in good quantities in BSPC. Nitrogen extractability of BSPC in water was found to be higher at 1:40 (w/v) ratio and an extraction time of 40 min. Minimum nitrogen extractability (14 g/100 g protein) and maximum extractability (97 g/100 g protein) were observed at pH 4 and 12, respectively. In the presence of sodium chloride (0.1 and 0.5 M), the nitrogen extractability was found to be increased between pH 4-10. Protein precipitability was maximum (90 g/100 g protein) at pH 5.5. SDS-PAGE of BSM and BSPC showed different polypeptides with molecular weights from 205 kDa to 12 kDa. The lower water holding capacity and higher oil holding capacity, foam capacity and foam stability were noted in BSPC. The sorption isotherms studies showed that the BSPC was non-hygroscopic in nature.

Key words: bael seed, nutritional quality, fatty acid profile, functional characteristics, mineral content, amino acid composition, nitrogen extractability

INTRODUCTION

Although most protein concentrates and isolates have been traditionally prepared from oilseeds such as soybean, peanut, sesame and sunflower seeds, other leguminous proteins have also been used in the food industry because of their functional characteristics. The publications related to functional characteristics of commercial seeds/products include northern bean, winged bean, linseed flour, cowpea flour, faba bean(1-5), Bengal gram, pumpkin seed(6-7), beach pea protein isolate, sunflower meal, sesame seed, almond seed protein concentrate, sesame seed protein, erythrina seed flour, soy flour, peanut protein concentrate, and cashew nut(8-16).

Bael (Aegle marmelos L.) is a dry-land plant belonging to the family Rutaceae, which grows wildly in India. Physico-chemical characteristics of bael fruit pulp and preparation of beverages using sugar-milk and tamarind was reported(17). Shilpa and Rajyalakshmi(18) studied the preparation of blended bael fruit beverage and evaluated its storage stability at room temperature for two months. Flavor components of bael fruit(19), chemical composition of bael seed with protein content as high as 70% in de-oiled seed meal(20) were also reported. The fixed oil content of 18 g/100 g in the bael seed was reported(21). The oil was reported to be used as a purgative(22).

Though bael seed is rich in protein, literature on the utilization and characterization of the seed protein is limited. Hence, the present investigation was undertaken to prepare the bael seed meal (BSM) and bael seed protein concentrate (BSPC) and evaluate the proximate composition, mineral content, amino acid composition and functional properties of the seed proteins. The studies will be helpful in the commercial utilization of bael seed in preparation of various protein rich food products.

MATERIALS AND METHODS

I. Materials

Bael fruits were procured from different forest sources...