

## ABSTRACT

The study was aimed at development of process technology for production of bael (*Aegle marmelos* L.) pulp powder from ripe fruit using foam-mat drying technology. The pulp after removing the seeds and fiber was converted into stable foam. Experiments were conducted using central composite rotatable design and the foaming additives and foaming time were optimized as Glycerol monostearate 3.1% (w/w), Methyl cellulose 0.32% (w/w), pulp concentration 13.2 °Bx and whipping time 2 min at a constant air flow rate  $10\text{ L min}^{-1}$  and whipping blade speed 5000 rpm. The foamed pulp (Density  $0.635\text{ g cm}^{-3}$ , Drainage volume 1.7 mL) was dried in recirculatory convective air dryer using optimized process variables viz. air temperature  $53.5^{\circ}\text{C}$ , velocity  $1.0\text{ m s}^{-1}$  and sample thickness 2 mm. It took 150 min for drying and vitamin C retention in dried product was 63.2%. The dried samples were conditioned ( $10 \pm 1^{\circ}\text{C}$ , 1–2 h) and converted into powder. From 1 kg ripe fruit (700 g pulp) 295 g free flowing powder with 3.6% moisture (db) was obtained. The Peleg model fitted best for both the pulp and powder samples for adsorption and desorption. The net isosteric heat of sorption ranged from 3.97 to  $1.0\text{ kJ mol}^{-1}$  for bael pulp at moisture ranges of 0.5 to 3.5 g/g dry matter and from 2.60 to  $0.87\text{ kJ mol}^{-1}$  for powder at moisture ranges of 0.25 to 1.13 g/g dry matter. The powder has good colour, flavour and dispersibility properties and retained good amount of bioactive compounds. Seven major soluble and wall bound phenolics present in pulp were identified and quantified. The shelf life of powder under accelerated storage ( $38 \pm 2^{\circ}\text{C}$ ,  $90 \pm 1\%$  RH) was 39 days. Fuzzy analysis of sensory data showed that bael drink prepared using foam-mat dried powder was comparable with that of the freeze dried powder in sensory attributes. A rapid and nondestructive FT-NIR spectroscopic method was developed for the determination of moisture in bael pulp.

**Keywords:** bael (*Aegle marmelos* L.), bael powder, foam stability, foam-mat drying, FT-NIR spectroscopy, bael drink