Effect of sieve opening on particle size and physicochemical properties of conventionally and cryogenically ground ginger powder

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Abstract

The cryogenic grinding method is extensively used to get the best quality of spice powders. In this work, ginger powder was produced by conventional grinding and cryogenic grinding processes. Three different ring type sieves with different opening sizes (0.12, 0.2 and 0.5 mm) were used during grinding processes. The particle size analyses of the ground particles were carried out, utilizing the laser particle size analyzer. Mean particle size of cryo-ground particles were finer than conventional-ground ginger in different sieve opening conditions ($p \leq 0.05$). Surface morphology was studied using SEM (Scanning electronic microscope) analysis. Better flowability was demonstrated for cryogenically ground ginger and flowability was decreased by decreasing sieve opening from 0.5 to 0.12 mm. Chemical properties such as volatile oil content, total phenols, total flavonoids and antioxidant activity in DPPH assay were also studied. Cryo-ground ginger powder retained 20%-35% more volatile oil, showed better antioxidant activity compared to ambient ground ginger. The analysis confirms the usefulness of cryo-ground process in producing finer particles for heat-sensitive and fibrous materials such as ginger.

Keywords: Ginger powder, cryo-grinding, particle size and volatile oil