ABSTRACT

Onion and ginger are popular flavouring ingredients of food preparations world over. Approximately 20 to 30% of the crops is spoiled at farm level due to improper post harvest practices. Preservation and value addition to such perishable products at farmers' or village level is of great significance for development of agro industries in rural sector. A laboratory tray dryer incorporating the features of recirculation of exhaust air, control over air flow rate and precise control over temperature was designed and fabricated. The drying experiments were conducted on 3 mm thick onion and ginger slices (tray load: 6.3 kg/m^2) at drying air temperatures ranging from 323 to 373 K with an increment of 10 K for the air flow rates of 0.78, 1.17, 1.56 and 1.95 $m^3/s\text{-}m^2$ without exhaust air recirculation.

The residual flavour component and optical index of dehydrated onion slices at a particular moisture content were determined with the analytical procedures for single, two- and three-stage dehydration and an economical 3-stage dehydration process was suggested. The volatile oil content of ginger slices dehydrated to 8% m.c.(d.b.) at various drying air temperatures and flow rates was estimated analytically and a single stage process was recommended.

The drying experiments were conducted on onion slices with drying air temperature of 343 K with an air flow rate of 1.56 $m^3/s\text{-}m^2$ for recirculation ratios of 0.5, 0.6, 0.7, 0.8 and 0.9 started after drying time of 5, 10, 20 and 30 min. By maintaining recirculation ratio of 0.9 started after 5 min, 39% drying energy was saved. Drying experiments were conducted on ginger slices at air temperature of 353 K with an air flow rate of 1.56 $m^3/s\text{-}m^2$ for recirculation ratios of 0.5, 0.6, 0.7, 0.8 and 0.9 started after same drying time intervals. Recirculation ratio of 0.8 started after 5 min saved the drying energy of 57.7%.

Key words: Dehydration, onion slices, ginger slices, drying air temperature, air flow rate, energy consumption, per cent residual flavour component, optical index, volatile oil content, recirculation ratio.