

ABSTRACT

The relevant physical properties, like densities, porosity, terminal velocity, coefficient of static friction and angle of repose were evaluated for groundnut pod (AK-12-24 variety) and its fractions in the moisture range of 5 to 50% (d.b.). All these parameters were found to be linearly related to the moisture content of the product. Thermal properties like specific heat and thermal conductivity were also measured for groundnut pod, kernel and hull, and were found to increase linearly with moisture content and temperature. The specific heat of hull and thermal conductivity of the kernel were found to be the highest amongst the three. The equilibrium moisture content and excess heat of sorption of groundnut hull were found to be the highest followed by that of pod and kernel over a wide range of temperatures (35 to 65°C) and equilibrium relative humidities (11-96%). Among the various models tested, GAB, Chung-Pfost and Smith model gave the best fit to the experimental data for the entire range of relative humidities (water activity) and temperatures of the equilibrium condition. Thin-layer drying experiments were conducted with freshly harvested groundnut pods using five levels of relative humidities (9-70%) for each of the drying air temperatures of 35, 45, 55 and 65°C with a constant air flow rate of 1 m/s. A thin-layer dryer coupled with an evaporative coil of a refrigeration system (as dehumidified air system) was used for the drying experiments. Among the three different models viz. Lewis, Page and Two term model, the last model was found to fit very well to the experimental data over the entire range of drying conditions. Effects of drying parameters on physiological characteristics such as germination, viability and vigour index of the dried groundnut kernels and chemical characteristics such as free fatty acid, peroxide value, refractive index and colour of the extracted oil from the decorticated kernels obtained from the pods dried in different drying conditions were studied. Based on the milling and seed quality such as germination, viability and vigour index, a combination of a drying air temperature of 35°C and relative humidity of 50% with an air flow rate of 1 m/s appears to be suitable for drying of groundnut pods for seed purpose. From the stand point of total drying time, milling quality and other quality parameters such as FFA, peroxide value and colour of the oil a combination of a drying air temperature of 45°C and relative humidity of 50% with an air flow rate of 1 m/s is found suitable for drying of groundnut pods for oil extraction purpose.

Key words: Drying, dehumidified air-drying, groundnut sorption characteristics, property of groundnut.