

**Title** Physical and mechanical properties of *Jatropha curcas* L. fruits, nuts and kernels  
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#### **Abstract**

The post-harvest physical and mechanical properties of *Jatropha curcas* L. fruits, nuts and kernels were investigated and reported, and their application was also discussed. The physical properties studied include moisture content, 1000-unit mass, fruit part fraction, dimensions, geometric mean diameter, sphericity, bulk density, solid density, porosity, surface area, specific surface area, static friction coefficient on various surfaces and angle of repose. The mechanical properties were rupture force, deformation at rupture point, deformation ratio at rupture point, hardness and energy used for rupture (toughness). The hull of the fruit had very high moisture content compared to nut shell and kernel. The whole fruit contained 77.03% w.b. moisture content. The sphericity values indicated that fruit shape (0.95) is close to a sphere compared to nut (0.64) and kernel (0.68), both of which are close to an ellipsoid. Bulk densities of fruits, nuts and kernels were 0.47, 0.45 and 0.42 g/cm<sup>3</sup>, the corresponding solid densities were 0.95, 1.04 and 1.02 g/cm<sup>3</sup>, and the corresponding porosities were 50.53%, 56.73% and 58.82%, respectively. The surface area of fruit was larger than those of nut and kernel, by 5.88% and 10.24%, respectively. The static coefficient of friction and angle of repose of kernels on all surfaces studied (plywood, steel, and stainless steel) were the highest as the surface is viscous and hardness is less. Rupture force, hardness and toughness of fruit, nut and kernel were 135.39, 146.63 and 67.72 N; 30.58, 69.98 and 38.52 N/mm and 300.88, 124.44 and 51.61 N mm, respectively.