ABSTRACT

In order to obtain maximum yield of whole kernel from karingda seed (**Citrullus lanatus** ***(Thumb) Mansf,*** *some studies on mechanical dehulling was carried out. Several properties of the seed and the kernel, closely related to the developed dehulling process, were evaluated. The physical and frictional properties of seed and kernel were found to be linearly or non-linearly dependent on their moisture contents. Results on rupture characteristics of seed and its kernel under quasi-static compression test revealed that the seed required more energy to rupture its hull when subjected to compression in the longitudinal direction than in the transverse direction; this phenomenon was just opposite to that for the kernel. Irrespective of the sorption path, the equilibrium moisture content and excess heat of sorption of the hull, respectively at any particular temperature and moisture content, were highest followed by those of seed and kernel. Modified Chung-Pfost and GAB sorption models were found to have close fit to the experimental data over a wide range of equilibrium relative humidity (11-96%) and temperature (10-50°C). Theoretical aspects on dynamic* $\hat{S}$ *of seed and various forces involved in an abrasive dehulling process have been discussed. The effects of various machine and operating parameters as well as material characteristics on the dehulling performance of the under-runner disc sheller were studied. A clearance of 4-5 mm between the disc surfaces and particle size of 1.2 mm for the abrasive material coating on to disc surfaces were found to be optimum. Following the superimposed contour plot technique for optimisation, the best dehulling performance (dehulling efficiency 68.14-72.07%, percent broken 15.76 - 20.36%, specific energy consumption of 23.78 kJ/kg and dehulling index of* $\hat{0}.574$*) was obtained when medium size seeds (9.5 mm < length < 11.5 mm) with moisture contents in between 6.5-7.5% (d.b.) were dehulled at peripheral speeds of 15.5-16.5 m/s and a feed rate of 100 kg/h using optimum clearance and particle size of the abrasive coating. Analysis of karingda seed oil showed that the saponification and iodine numbers were 193 and 145.7 respectively, and contained 78.4% unsaturated fatty acids (67.3% linoleic and 11.1% oleic), 1.8% unsaponifiables and small quantities of soluble and insoluble volatile fatty acids.*

KEY WORDS : *Citrullus, Cucurbita seed, Physical and mechanical properties, Sorption characteristics, Dehulling, Karingda seed oil.*