ABSTRACT

A COMPUTER CONTROLLED LABORATORY MODEL SOLAR DRYER

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We have designed and built a laboratory model of a solar drying system comprising electronically controlled heaters and fans with a drying bin of volume $0.5m^3$, to be used in the rapid determination of effective drying regimes for various agricultural and other produce. A computer simulation of the solar collector was constructed to determine numerically the appropriate output temperatures and flow rates for our model. After calibration of the system, these values were then used to program the electronic power controllers, making for a very versatile physical model. Our tests on the model demonstrated controlled, reproducible flow rates of **0.3 - 1.2 ms^{-1}** and corresponding drying bin temperatures of **3 - 44 C°** above ambient were obtained. This allows simulation of high-flow-rate free convection systems as well as of forced convection systems designed for the drying of edible material.

We conducted trials on *Z. Mauritania* (**Dunk**) which showed that valuable data may indeed be rapidly obtained by use of our model. The results indicate that forced convection drying is essential for this fruit and that, on our scale, suitably prepared samples can be dried to 20% water content (wet basis) in approximately one drying day, without unacceptable loss of quality.