Deng ghana quot solar dryer quot

Deng ghana quot solar dryer quot

Worldwide, approximately 1.3 billion tons of food for human consumption is lost every year [7], which equals roughly one-third of total production (32.5%) [8]. The annual value lost is estimated at US$4 billion, which exceeds the total US$6.1 billion SSA received between 1998 and 2008 in the form of food aid. This US$4 billon lost is equivalent to the annual caloric requirements of at least 48 million people (at 2,500 kcal per person per day) [9]. In SSA, per capita food losses are 170 kg/year [7], representing approximately 14% of global food losses.

To address this challenge, diverse technologies and methods have been developed. For small-scale farmers in the developing world, the use of solar energy through solar food dryers--here defined as devices that use solar energy to dry substances, especially food products [10]--is highlighted as a particularly promising solution [11, 12].

The type of solar dryer, the study location, and the type of dried products were extracted from the reviewed articles and reported in summary tables. The parameters used to assess the solar dryer performances and the key findings were also extracted from each study; thereafter the main limitations, challenges, and possible solutions for more sustainable application of PSD in the future were derived.

Another DSD was tested by Muhammadu and Abraham [49] in Nigeria to dry cassava. It took 76 h to reach a final water content of 12%. The maximum drying temperature was 43.8 ?C, and the maximum ambient temperature was 30.3 ?C. The observed drying efficiency was 52%, and the drying rate was 0.25 kg/hr.

Although it is often generally assumed that solar drying is a good strategy to improve food preservation and nutrient retention, the data supporting this assertion is weak. A large heterogeneity in methods and parameters for assessing the performance of solar dryers is found among the included studies, which may explain the diversity and sometimes contradictory assessments of the technology. Mulokozi and Svanberg [60] report a higher retention of all-transv-carotene with the use of a solar dryer compared to open-sun drying, whereas Bechoff, Tomlins [57] find no differences.

Parameters related to economics are the least reported in studies on the performance of PSD in SSA. Tiwari [68] indicates that financial viability is a key component, as solar dryers are generally capital intensive compared to other investments by farming and processing households. In fact, costs are the main determining factor for scaling up these technologies [20].

Although PSD are considered suitable for rural areas and are relatively cheaper than ASD, the quantities of dried products obtained might lead to unrealistic expectations. The current levels of productivity and efficiency are not ideal, since despite being relatively cheap, the initial costs that are necessary to obtain PSD may not be recovered, which is an unbearable burden in the context of resource-constrained communities.

Deng ghana quot solar dryer quot

Most solar dryers assessed in the reviewed studies report drying temperatures below or equal to 60 ?C, which indicate that they are ineffective for crops that require high-temperature drying. As such, these solar dryers can only dry a limited number of agricultural products (especially those that require low energy input). In this context, the development of low cost and efficient solar collectors should be a main focus of research on PSD in order to find a trade-off between energy efficiency and cost-effectiveness [75].