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"Competing pathways for equitable food systems transformation: Trade-offs and synergies"

Fast and gentle solar-sorptive drying of fruit and spices with energy efficient water recovery

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Abstract

To make fruit and spices more durable and free from contamination - such as dust, animals or even germs - there are different solar tunnel and green house dryers being investigated and also already commercially available. Most of them are only supported by solar energy and still depend on fossil fuels such as wood or gas to reach the needed temperatures especially when the humidity of the ambient air is already high.

The aim is thus, to develop a concept which is only solar driven by combining a green-house dryer with an adsorption process. By drying and heating up the process air via adsorption before entering the green house, the air can take up a lot more moisture from the goods to be dried and thus accelerate the drying process. This also makes gentle drying at low temperatures possible for delicate goods which otherwise will lose valuable flavors or aetheric oils. Solar thermal energy is used for the desorbing process. As a side-product, the water from the desorption process can be condensed to be used as drinking water or to wash the drying goods.

The authors aim to work on a common project to implement this concept e.g. for drying spices in Sansibar, which is one of the world's most arid regions with very little precipitation, contaminated ground water and at the same time very high average ambient humidity. Thus, the majority of the inhabitants has no access to hygienically safe drinking water. Therefore, this concept would bring a double benefit for food and nutrition security in Sansibar or comparable locations.

In the contribution, results from laboratory experiments and simulation studies are discussed and a first demonstrator will be presented.

Keywords: Drinking water, food drying, solar dryer, solar thermal energy

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