

COMBINED MEMBRANE AND SOLAR DRYING TECHNOLOGIES FOR FRUIT PRESERVATION IN MOZAMBIQUE

Ricardo Bernardo¹ *, Henrik Davidsson¹, Pia Otte², Randi Phinney³ and Lucas Tivana⁴

1: Division of Energy and Building Design, Lund Technical Faculty, Lund University
P.O. Box 118, 221 00 Lund, Sweden
{ricardo.bernardo, henrik.davidsson}@ebd.lth.se , <http://www.ebd.lth.se>

2: Centre for Rural Research, Trondheim, Norway
pia.otte@bygdeforskning.no , <http://www.bygdeforskning.no/en>

3: Department of Food Technology, Lund Technical Faculty, Lund University
randi.phinney@food.lth.se , <http://www.food.lth.se/food-technology-engineering-and-nutrition/>

4: Department of Rural Engineering, University Eduardo Mondlane, Mozambique
lucastivana@yahoo.co.uk , <http://www.agronomia.uem.mz/>

Abstract: In many developing countries, such as Mozambique in southern Africa, large amount of food is spoiled due to lack of food conservation methods. A possible solution to the storage problem is to dry the fruits so that they can be safely stored at ambient temperature and later consumed. Our research project consists of adapting and combining solar dryers with newly developed membrane pouches for drying juicy fruits. The use of a pouch makes it possible to dry juice from juicy fruits such as oranges which are not possible to be dried at open-air since the juice is lost when the fruit is sliced open. The pouch is made of a food-grade breathable membrane (i.e. permeable to water vapour but not liquid water) to concentrate fruit juices/purées using solar irradiation and ambient air. By using solar dryers food safety is improved as a result of higher temperatures, drying time is reduced, productivity is increased and there is additional protection from outdoor environment. The final product is a fruit jam/purée with shelf life of over one year.

The project follows a multi-disciplinary approach gathering, among others, food engineers, physicists, social scientists and agriculture engineers to increase chances of acceptance by small-hold farmers in Mozambique. Preliminary concepts of solar dryers and membrane pouches were tested with farmers in Mozambique.

The full paper shows highlights on three main aspects of the project: the solar dryers, the membrane pouches and social acceptance by the farmers. So far it was verified that the drying time of the membrane pouches could be reduced from four/five days to approximately half of that time when using solar dryers. Measurements of drying rates from an indoor solar simulator laboratory in Sweden and from a field trip in Mozambique will also be shown. Some of the main challenges so far are: degradability of the membrane bags in direct sunlight, mould growth on the outside of the pouch, limited available materials for the solar dryers and gender equality regarding work load by the farmers.

Keywords: Solar dryers, Fruit drying, Solar thermal, Food processing, Membrane pouches