



Tropentag, October 9-11, 2007, Witzenhausen

“Utilisation of diversity in land use systems:
Sustainable and organic approaches to meet human needs”

Development of a Solar Distillation System for Essential Oils Extraction from Herbs

ANJUM MUNIR, OLIVER HENSEL

University of Kassel, Agricultural Engineering, Germany

Abstract

The limited availability of fossil fuel and their environmental impact, have led to a growing awareness of the importance of solar renewable energy sources especially in tropical countries. Although the utilisation of solar energy is on vast scale world wide yet its application is restricted only to low temperature heating and drying. With the introduction of some innovative medium and high temperature solar collectors during the last decade, it is possible to best utilise the flux of incident radiant energy for food engineering and post harvest processing. Essential oils have been used throughout the world in foods, fragrances, perfumery, cosmetics and medicines. Extracting essential oils from herbs require a distillation process that traditionally uses large, centralised equipment. Such equipment not only requires high operating cost but also is unable to handle extremely delicate plants that must be processed soon after harvesting. Thus, for functional, environmental and economic reasons, there is a need for small-scale, decentralised solar distilling equipment. The main objective of research is to develop and evaluate the performance of solar based distillation system by utilising medium temperature collectors like vacuum tube and parabolic tough collector. The paper describes the first phase of research where a medium temperature solar collector system is installed at Solar Experimental Station, Witzenhausen and tested at different climatic conditions. It also includes results of laboratory experiments conducted with selected herbs to record optimum thermal and physical parameters for the conventional boiler and distillation unit. On the basis of laboratory experiments, the solar collector will be modified with some integrated circuits and auxiliaries to maintain the required thermal parameters. In the second phase of study, complete solar based distillation system will be developed comprising of solar boiler, still tank, condenser, Florentine flask etc and the performance of the complete solar distillation system for essential oils extraction will be evaluated.

Keywords: Distillation, essential oils, herbs, solar collectors