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Development of hybrid solar distillation system for essential oil extraction

Arslan Afzal, Anjum Munir, Abdul Ghafoor, Jorge L. Alvarado

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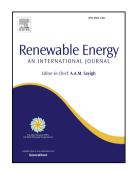
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ACCEPTED MANUSCRIPT

1	Development of hybrid solar distillation system for essential oil extraction
2 3 4	Arslan Afzal ^{a*} , Anjum Munir ^a , Abdul Ghafoor ^a , Jorge L. Alvarado ^b ^a Faculty of Agricultural Engineering & Technology, University of Agriculture, Faisalabad-
5 6	Pakistan ^b Department of Engineering Technology & Industrial Distribution, Texas A & M University-
7	USA
8 9	Abstract
LO	
l1	Use of solar energy for cooking and steam generation is quite common around the world
L2	However, use of solar energy for extraction of essential oils from medicinal and aromatic plants
L3	has recently been explored and its effects are still largely unknown. The current study is about
L4	essential oil extraction using a newly designed solar distillation system. The devised system
L5	consists of a primary reflector (Scheffler concentrator), steam receiver, distillation still
L6	condenser and a florentine flask to enable extraction of essential oils from biomass. An auxiliary
L7	biomass system was also coupled with the distillation unit to complement the system during
L8	adverse weather conditions or seasonal climatic conditions throughout a typical year. The
L9	experimental results show that essential oils from fresh Eucalyptus leaves (Camaldulensis) and
20	Peppermint leaves (Mentha peperita L.) were 0.59 % w/w and 0.40 % w/w, respectively
21	Essential oil from Pinus (Roxburghii) was extracted using a biomass boiler yielding 0.31% w/w
22	of essential oil. GC-MS analysis confirmed the presence of Eucalyptol (50.9%), Menthol (93.0
23	%) and α -Pinene (70.9 %) as the major compounds in Eucalyptus, Peppermint and Pinus
24	respectively. In summary, solar-based distillation has proven to be a cost effective way of
25	extracting essential oils from medicinal plans and herbs.
26	
27	Keywords: Solar distillation system, essential oil, biomass boiler, GC-MS analysis, Eucalyptus
28	(Camaldulensis), Peppermint (Mentha peperita L.) and Pinus (Roxburghii)
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