Thesis Title	Industrial Scale Solar Vegetable Drying with Supplemental Heat from Steam
Thesis Credits	12
Candidate	Mr. Venus Thadniam
Supervisors	Prof. Dr. Somchart Soponronnarit
	Mr. Thanit Swasdisevi
Degree of Study	Master of Engineering
Department	Energy Technology
Academic Year	1999

Abstract

An industrial - scale solar vegetable dryer with a capacity of 100 kg was designed, constructed and tested at a food factory in the North East of Thailand. The complete solar drying system consists of four dryers. The main parts of a dryer are as follows: a solar collector with an area of 73 m^2 , a 2 kW blower, a drying cabinet and an air to steam heat exchanger. The dryer used solar energy and steam as heat resources for drying vegetables such as chopped spring onion, cabbage, ginger, turmeric, green banana, basil and chili, area of solar collector was 292 m^2. Steam was used to supplement solar energy at low intensity. A central boiler with capacity of 5 tons/ h was used to supply the air to steam heat exchanger. Drying air temperature was controlled at 60 $^{\circ}C$ in each experiment. In operation, air was sucked from the solar collector, heated by air to steam heat exchanger if air temperature was lower than a set value, and blown into the drying cabinet. Vegetable with approximate initial moisture content of 75 - 85 % w.b. was dried to approximate final moisture content of 5 - 10 % w.b. within 4 - 6 h. Experimental results showed that drying efficiency, efficiency of solar collector and system efficiency were 43 % , 53 % and 18 %, respectively.For cost analysis , It was found that total drying cost was 3.6 bath/kg - water evaporation. It was divided into fixed cost 2.1 bath/kg - water evaporation and operation cost 1.6 bath/kg - water evaporation. The average energy of drying was 8,270 MJ/day. It was divided into solar energy 4,5451 MJ/day , energy from steam 3,426 MJ/day and electrical energy 300 MJ/day

Keywords: Dryer / Solar Energy / Vegetable