5. CONCLUSION AND FUTURE WORKS

5.1 Conclusions

Clean, white copra could be able to produce from the hybrid dryer. The amount of white copra that can be obtained mainly depends on drying temperature. But, exposure to hot air for a long time even at lower temperatures could also make the color of copra to light brown. Furthermore, the production of brown copra was very low with the hybrid dryer when drying temperatures are lower than 70 ºC. Bad quality copra such as scorched copra and mouldy copra were not observed in hybrid drying but very low amount of slimy copra was observed. Percentage of slimy copra was highest at the top compartment of multi bed drying where 6.67% of slimy copra was recorded.

The main drawback of multi bed drying is the difficulty in maintaining similar temperature profiles in all 3 compartments. Therefore a quality variation among the copra dried in 3 different compartments was unavoidable. Specifically the production of brown copra was significantly high in the bottom compartment where the average drying temperature was more than 70 ºC. However, a significant reduction in drying time could be achieved compared to single bed drying. The copra production rate for multi bed drying was 0.74 kg/hr which is almost double the rate for single bed drying of 0.35 kg/hr. This may be due to the achieving of low specific moisture evaporation (SMER) rate (32.11 MJ/kg) in the multi bed drying compared to the single bed drying (54.27 MJ/kg).

Coconut oil similar to virgin coconut oil by appearance and quality could be extracted from the copra produced in the hybrid dryer. This had been a good achievement since the thick brown skin of the coconut was not removed before extraction which involves labor. The color of the oil was acceptable even with the light brown copra obtained from the bottom compartment of multi bed drying.

5.2 Future Works

Coconut oil produced in this study can be used to some value adding processes. Generally, the RBD coconut oil is also supplied with light yellow color. But if this oil is used for refining, colorless and refined oil can be supplied to the market

without following bleaching step. That will attract more oil consumers due to the health benefits and pleasant appearance.

This oil can be used to produce some cosmetic items such as herbal oil, body oil and body lotion. The colorings could be added to the oil easily due to colorless nature of it and the final product will be brighter. The possibility of using this oil as white oil or virgin oil for already available applications needs to be evaluated with reference to the color, odor and nutritional & medicinal quality. To reduce the cost of production, the thermal losses of the system should be minimized. The biomass stove can be made with low thermal conductive material such as fire brick to minimize the heat losses. In this study, solar collector and drying chamber were made with metallic materials. But in permanent drying systems, the solar collector and drying chamber could also be fabricated with locally available material like bricks and clay. That will reduce both heat loss and the initial capital cost. Additionally, a suction fan or blower could be attached to the flue gas exit to facilitate the flue gas flow and to increase the combustion efficiency. Wind ventilator is a good option to achieve this with low capital outlay and low operation cost.

All the drying experiments of this study were carried out at a single location close to Colombo, where the average solar radiation is considerably low compared to most of the locations within coconut triangle such as Puttalam and Chilaw. Further experiments are required to verify the performance of the dryer with reference to areas of high solar radiation.

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