

RE DRYING OF BLACK TEA BY USING DEHUMIDIFIED AIR

BY

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Declaration

The work describe in this thesis was carried out by me under the supervision of Professor Arthur Bamunuarachchi, Department of food Science and Technology, faculty of Applied sciences, ,University of Sri Jayewardenepura, Sri Lanka and the report on this thesis has not been submitted in whole or in part of any university or institute for another degree .

Date. 25. 01. 2014



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I certify that the above statement made by the candidate is true and this thesis is suitable for submission to the university for the purpose of evaluation.



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Re Drying of Black Tea (*Camelia synansis*) by using dehumidified air

By

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Abstract

Sri Lanka is one of the best quality black tea producers in the world. Black tea is dried or fired until it reaches 3% moisture content and this preserves the sensory and organoleptic properties of tea. After tea is dried or fired it is exposed to various types of handling operations including grading and sorting, stalk extraction, iron removal, color separation, storage as well as blending. These operations are mostly done in ambient conditions and exposed to the humid air. Since tea is hygroscopic in nature it absorbs the moisture.

Series of experiments and trials were planned and performed to develop an industrial scale re drying method to reduce the moisture content of black tea by using dehumidified air. Dried and moisture absorbed tea was subjected to various types of drying temperatures and found out by sensory evaluation when the temperature below 35°C does not alter the sensory or the organoleptic properties of the tea.

The ambient air was cooled to different temperatures from 10°C to 30°C and fed into the dehumidifier to adsorb the moisture in the cooled air. It was found that the lowest temperature of 10°C gave the best results of the lowest relative humidity of 10% at 35°C.

Two drying methods were carried out, horizontal fluidized bed dryer and vertical bin type dryer. It was found that the bin type dryer consumes less space, lower energy and performs faster drying.

Above conditions, air having 35°C temperature and 10% relative humidity were sent through a tea sample over the period of time and measured the moisture content of the tea every 15 minutes by using infra-red moisture meter. With the above data drying curve was established and found out within 1 ½ hours tea can be dried to 4.5% from 13%.

By using an air conditioner and Bry Air Dehumidifier model FFB 170 coupled to a drying bin and made a proto type, pilot scale system for trials and it gives expected results of reduction of moisture to 4.5% within 2 hours without altering the sensory and organoleptic properties.

Pilot scale unit was scaled up to a industrial scale unit by using two units of 24,000 BTU Air conditioners and Bry air dehumidifier model FFB 600 and black tea drying bin. Calculations were done to confirm the moisture adsorption capacity of the dehumidifier.

Industrial unit was developed very successfully and it was capable of handling 960Kg of black tea and reduced the moisture content from 13% to 4.5%

It was confirmed that the re dried tea by using cooled dehumidified air does not alter the sensory and organoleptic properties.

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