

USE OF STATISTICAL METHODS IN THE DEVELOPMENT OF
WITHERING TECHNIQUES AND MOISTURE DETERMINATION IN
TEA AND CERTIFICATION OF ORGANIC TEA

By

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ABSTRACT

Cost of tea production in Sri Lanka is higher than that of other tea producing countries. Therefore higher comparative prices are always quoted for Sri Lankan teas in order to maintain profit margins. This has created vulnerable situation for us in the competitive international market. A few practical solutions based on actual experiments and actual data generated from the several studies were used to obtain methods of improving the quality of tea.

Analysis of critical moisture content of green leaf and two zones of falling rate period, using different statistical techniques are presented. Use of this analysis to estimate moisture evaporation rate during withering process, is explained. Applications of these findings to reduce cost of tea production and to introduce a fair method for green leaf payment and to improve the quality of tea, are elaborated. Finally, a new withering technique is proposed for efficient and low cost withering of green leaf. A new withering chamber is being designed for withering of green leaf. Patent rights will be taken in the near future.

A new theory is introduced to determine the moisture content of green leaves using a parallel plate capacitance theory. Advantages of sensitivities of temperature and moisture content

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on capacitance were used very effectively in this design. When green leaves are put in parallel plate cell, temperature is built up due to the catabolic reactions in leaf. Temperature sensitivity on capacitance was statistically analyzed and a new model was proposed for temperature sensitivity on capacitance for green leaf. The model for sensitivity of moisture content on capacitance derived from the new theory was combined with the model for temperature sensitivity on capacitance, obtained from data analysis for the final application of moisture determination. Moisture determination of green leaves, supplied to a tea factory, promptly at the site, results in calculation of fair payment system along with the information obtained on critical moisture content of green leaf. In addition to the fair leaf payment system, information of moisture levels at different stages in withering, facilitate to reduce energy wastage in withering and to improve the quality by achieving exact degree of wither for different type of macerations. A new moisture meter is being designed to determine the moisture content of green leaf under patent rights.

Organic tea is considered as value added teas and contributes to our economy by getting additional income for the value addition in Sri Lanka. However, certification of larger number of tea lands is very expensive since international inspectors have to be paid according to the number of inspection days. When there is a very strong Internal Control System (ICS), number of

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inspection days can be reduced markedly, thereby reducing the cost of certification.

Yield data of small organic tea farmers was analyzed using Time Series methods. Predicted yield estimate can be used to reject additional leaf supply to the project as a strong aspect of ICS. De-seasonalized trend factor was considered in the analysis for the correct prediction using the best statistical model. This leads to a low cost inspection and low cost of production for value added organic teas. Finally quality of organic tea can be improved while credibility of inspection is maintained using the method proposed in the study.