

DEPT. OF AGRICULTURAL ECONOMICS
FACULTY OF AGRICULTURE
22 DEC 2017
Eastern University, Sri Lanka.

**EFFECT OF CLIMATIC VARIABLES ON YIELD OF TEA IN
KANDY REGION**

LIBRARY
22 JUN 2018
EASTERN UNIVERSITY, SRI LANKA

BY
D.D.C.D. MENIKE



FAG504

Project Report
Library - EUSL

**FACULTY OF AGRICULTURE
EASTERN UNIVERSITY
SRI LANKA
2017**

PROCESSED
Main Library, EUSL

ABSTRACT

The tea industry is Sri Lanka's main net foreign exchange earner and source of income for the majority of laborers. It was argued that tea yield is strongly related climatic variables. There were many variables associated with tea yield. A study was undertaken to find out the effect of climate variables on yield of tea in Kandy region. The objectives of this study were to find out the relationship between tea yield and climatic variables using time series analysis, and to formulate a suitable model to forecast the tea yield. Relevant data were collected from the Tea Research Institute of Sri Lanka and the Department of Meteorology and the variables were monthly total tea yield in metric ton, monthly mean temperature in Celsius, monthly total sunshine in hours and monthly average relative humidity in percentage. The Augmented Dickey-Fuller Test was used and confirmed that data on tea yield in Kandy was stationary. The correlation coefficient was computed between the tea yield and the monthly values of the climatic variables of the same year. Box-Jenkins model was used and selected the ARIMA (3, 0, 2) model for study which had the minimum AIC value among the models. Results of the Ljung-Box Q-test revealed that residuals were random. Forecasting was done to find the total amount of monthly tea yield expected for the next five years for Kandy. Tea plantation was found that there was a steady increase in the yield of tea in Kandy region.

Keywords: ARIMA model, ADF, Climate change, Forecasting, Tea yield.

TABLE OF CONTENTS

	Page
ABSTRACT	i
ACKNOWLEDGEMENT	ii
TABLE OF CONTENT	iii
LIST OF TABLES	vi
LIST OF FIGURES	vii
ABBREVIATIONS	viii
CHAPTER 1 -INTRODUCTION	1
1.1 Background	1
1.2 Problem statement	3
1.3 Objective of the Study	3
1.4 Summary	3
CHAPTER 2- LITERATURE REVIEW	4
2.1 Tea in Sri Lanka	4
2.2 Tea Production	5
2.3 Climatic Requirement of tea	8
2.3.1 Effects of environmental factors on yield of tea	8
2.4 Response of tea to climate change	12
2.5 Vulnerability of Sri Lanka tea production to global climate change	13
2.6 Cultivation areas	14
2.7 Climate and yield of tea	15
2.8 Climate and yield of tea in Sri Lankan context	16
2.9 Time series analysis	19

2.9.1	Objectives of time series analysis	21
2.9.2	Technique of Forecasting	21
2.9.3	Modeling of Weather Parameters Using Stochastic Methods	22
2.9.4	Stationary Time Series	22
2.9.5	Stationary and input series	23
2.9.6	ARIMA model fit to the data	24
2.9.7	Box Jenkins forecasting method	24
2.10	Summary	25
CHAPTER 3 - RESEARCH METHODOLOGY		26
3.1	Sampling Scheme and Data collection methodology	26
3.2	Descriptive Analysis	26
3.3	Distribution of the Data	26
3.3.1	Shapiro-Wilk normality test	26
3.4	Stationary of Data	27
3.5	Auto Correlation Function (ACF) and Partial Auto Correlation Function (PACF)	27
3.6	Box-Jenkins and ARIMA model	27
3.7	Regression Analysis	28
3.7.1	Durbin – Watson Test	28
3.8	Summary	28
CHAPTER 4 -RESULTS AND DISCUSSION		29
4.1	Trends of climatic variables and tea yield	29
4.2	Descriptive Statistics of Variable	33
4.3	Stationary of the tea yield data series	34

4.4	Model Estimate	35
4.4.1	Check the Model Adequacy	36
4.4.2	Forecasting for the year (2016-2020)	36
4.5	Regression Analysis	37
4.5.1	Regression model Estimate and model selection	37
4.6	Residual Analysis and Remedial Measures	38
4.7	Summary	38
CHAPTER 5 -SUMMARY AND CONCLUSIONS		39
5.1	Summary	39
5.2	Conclusions	41
5.3	Recommendations	42
REFERENCES		43