

**EFFECT OF SOIL MOISTURE DEFICIT STRESS ON
SELECTED AGRONOMIC PARAMETERS OF
TOMATO (*Lycopersicon esculentum* Mill.)
AT DIFFERENT GROWTH STAGES**



BY

MYLVAGANAM JEYACHANDRAN



Project Report
Library - EUSL

233

FACULTY OF AGRICULTURE

EASTERN UNIVERSITY

SRI LANKA

2007.

PROCESSED
Main Library, EUSL

ABSTRACT

A study was conducted in the land of the Agronomy Farm at the Eastern Eastern University of Sri Lanka, Vantharumulai located in Eastern region during the *Yala* season of April 2007 to August 2007 to determine the Agronomic responses of soil moisture deficit stress of Tomato (*Lycopersicon esculentum*) variety KC 1 during the vegetative, flowering, early fruiting and fruit ripening stage. The experiment was designed out in a Randomized Completely Block Design (RCBD) with five treatments and four replications in accordance to the recommended practices of Department of Agriculture (DOA) with relation to farmer adaptation at Eastern region.

Moisture stress was imposed for different treatments for a period of four days each at the above growth stages. The stress treatment was imposed by with holding water completely at once. The control plants were watered to field capacity for every day. The observation and data measurement were made from ten days after transplanting to harvesting during each stress cycle at different growth stages (vegetative, flowering, early fruiting and ripening stage). Measurement data were analyzed by using SAS (ANOVA) to determine the suitable stage/ stages able to give better yield at moisture stress condition.

In each treatment the Crop Growth Rate (CGR), Net Assimilation Rate (NAR) and Root → Shoot Ratio (RSR) and yield were changed by moisture stress and significant differences were found among them and the plants without any effect of moisture stress on yield / relatively avoidable effect on yield should be the suitable for, it was the long period of moisture stress in the stage of ripening and vegetable through the comparison of moisture stress condition with control treatment without moisture stress.

TABLE OF CONTENTS

	Page No.
ABSTRACT	I
ACKNOWLEDGEMENT	II
TABLE OF CONTENTS	IV
LIST OF TABLES	VIII
LIST OF FIGURES	IX
LIST OF PLATES	X
1. INTRODUCTION	01
2. LITERATURE REVIEW	08
2.1 Development of water stress	08
2.2 Effects of water deficit stress in relation to ontogeny	09
2.2.1 Seed germination and seedling establishment	09
2.2.2 Vegetative growth	10
2.2.3 Reproductive growth	10
2.3 Effects of water stress on Crop Growth Rate	11
2.4 Effects of water stress on Root - shoot ratio	13
2.5 Effects of water stress on Net Assimilation Rate	14
2.6 Beneficial effects of water stress	18
2.7 Tomato	19
2.7.1 Origin and distribution of tomato	19
2.7.2 Taxonomy	20

2.7.2.1 The Binomial classification	20
2.7.3 Types of tomato varieties	21
2.7.4 Morphology of the crop	21
2.7.4.1 Stem	21
2.7.4.2 Leaf	22
2.7.4.3 Root	22
2.7.4.4 Floral morphology	22
2.7.4.5 Fruit	22
2.7.4.6 Seeds	23
2.7.5 Soil	24
2.7.6 Climate	24
3. MATERIALS AND METHODS	25
3.1 Location	25
3.2 Nursery practices	25
3.3 Field preparation	26
3.4 Transplanting	26
3.5 Treatment structure	27
3.6 The experimental design	29
3.7 Fertilizer application	30
3.8 Plant protection	30
3.9. Soil moisture determination	31

3.10 Agronomic measurements	32
3.10.1 Crop Growth Rate	32
3.10.2 Root – Shoot Ratio	33
3.10.3 Net Assimilation Rate	34
3.11 Harvesting	34
3.12 Statistical analysis	35
4. RESULTS AND DISCUSSION	36
4.1 General appearance of plants	36
4.1.1 Regularly watered plants	36
4.1.2 Re – watered plants	37
4.1.3 Water stressed plant	37
4.2 Soil moisture contents	37
4.3 Crop Growth Rate	40
4.4 Root - Shoot Ratio	43
4.5 Net Assimilation Rate	46
4.6 Yield	49
5. CONCLUSIONS	51
6. SUGGESTIONS FOR FUTURE STUDY	53
REFERENCES	55
APPENDICES	