

**EFFECTS OF SALT STRESS ON THE
PHYSIOLOGICAL AND GROWTH ATTRIBUTES OF
SELECTED GROUNDNUT (*Arachis hypogaea* L.)
CULTIVARS**



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ABSTRACT

Salinity is one of the most deleterious environmental dilemmas that severely limit plant growth and productivity in the dry zone areas of Sri Lanka. Groundnut is grown in the Batticaloa district to a limited extent; the yield is highly susceptible to salt stress especially in the water scarce areas. This experiment was conducted at the Agronomy farm of the Eastern University, Sri Lanka in the 'Yala' 2019. Studies were made to evaluate salt stress tolerance of selected groundnut cultivars; 'Tissa', 'Indi' and 'Lanka Jumbo' when salt stress was imposed during the vegetative stage and to determine the most salt tolerant groundnut cultivar which can resist salinity and produce substantial yield. The groundnut plants were grown in polyethylene bags and the experiment was laid out in the Randomized Complete Block Design with six treatments and four replications and the treatments were arranged in 3×2 factor factorial manner. Salt stress was imposed for the selected groundnut cultivars from 32 days of sowing during the vegetative stage.

A concentration of 100 mM NaCl solution was applied as the salt stress treatment and the control plants were watered at 2 days interval to Field Capacity. There were significant ($p < 0.05$) differences between treatments in the measured physiological and growth attributes. Salt stress significantly ($p < 0.05$) reduced the Relative Water Contents (RWC) of all the tested groundnut cultivars. The highest RWC (69.6%) was observed in 'Indi' groundnut cultivar and the lowest was found in 'Tissa'. The highest amounts of Chlorophylls a (1.8 mgg^{-1}), b (0.6 mgg^{-1}) and total Chlorophyll (1.7 mgg^{-1}) contents were observed in 'Indi' groundnut cultivar and the lowest Chlorophylls a (0.7 mgg^{-1}), b (0.2 mgg^{-1}) and total chlorophyll (0.7 mgg^{-1}) were recorded in 'Tissa' groundnut cultivar.

Salt stress significantly ($p < 0.05$) reduced the plant shoot length of all the tested groundnut cultivars. The highest plant shoot length (30.5 cm) was observed in 'Indi' groundnut cultivar and the lowest (16.7 cm) was found in 'Tissa'. Salt stress significantly ($p < 0.05$)

reduced the Leaf Area Index (LAI) of all the tested groundnut cultivars. The highest LAI (0.73) was observed in 'Indi' groundnut cultivar and the lowest (0.42) was found in 'Tissa'. Salt stress significantly ($p < 0.05$) reduced the plant dry weights of all the tested groundnut cultivars. The highest plant dry weight (168.5 g) was observed in 'Indi' cultivar and the lowest (108.7 g) was found in 'Tissa'.

Moisture stress significantly ($p < 0.05$) reduced the yield of all the tested groundnut cultivars. The highest yield (1.4 tha^{-1}) was obtained in 'Indi' groundnut cultivar and the lowest (0.5 tha^{-1}) was found in 'Tissa'. Moisture stress significantly ($p < 0.05$) reduced the number of pods per plant of all the tested groundnut cultivars. The highest number of pods per plant (18) was observed in 'Indi' groundnut cultivar and the lowest (9) was found in 'Tissa'. There were significant ($p < 0.05$) differences between treatments in the 100 seed weight and shelling percentage of selected groundnut cultivars. The highest 100 seed weight (39.8 g) was obtained in 'Indi' cultivar and the lowest (15.6 g) was found in 'Tissa'. 'Indi' cultivar showed the highest shelling percentage (66.4%) and the lowest (45.2%) was found in 'Tissa'.

There were also significant ($p < 0.05$) interactions between cultivars and moisture stress treatments on the RWC, Chlorophylls a and b, plant shoot length, LAI, plant dry weight, 100 seed weight and shelling percentage of the tested groundnut cultivars. However, no significant ($p > 0.05$) interaction was observed on between cultivars and salt stress treatments the Total Chlorophyll content.

The highest yield obtained in 'Indi' groundnut cultivar under salt stress condition would have been due to its inherent characteristic feature. Based on the measured physiological and growth attributes, 'Indi' was identified as the most salt tolerant groundnut cultivars which could be suggested for cultivation in the saline areas of the Batticaloa district.

TABLE OF CONTENTS

	Page No
ABSTRACT	I
ACKNOWLEDGMENT	III
TABLE OF CONTENTS	IV
LIST OF TABLES	VIII
LIST OF FIGURES	IX
LIST OF PLATES	X
ABBREVIATIONS	XI
CHAPTER 1 INTRODUCTION	1
CHAPTER 2 LITERATURE REVIEW	6
2.1. Oil seed crops	6
2.2. Groundnut (<i>Arachis hypogaea</i>)	8
2.2.1. Origin and distribution	9
2.2.2. Groundnut cultivation in Sri Lanka	9
2.2.3. Groundnut cultivation in the Batticaloa district	10
2.3. Taxonomy of groundnut	11
2.4. Botanical description of groundnut plant	11
2.4.1. Root	13
2.4.2. Stem	13
2.4.3. Leaf	13
2.4.4. Peg	14
2.4.5. Pod	14
2.5. Growth and development of groundnut plants	15
2.5.1. Vegetative stage (V)	15

2.5.2. Reproductive stage (R)	17
2.6. Nutritional composition of groundnut seeds	20
2.7. Importance of groundnut cultivation	21
2.8. Characteristic features of tested groundnut cultivars	23
2.8.1. Cultivar "Tissa"	23
2.8.2. Cultivar "Tadi"	24
2.8.3. Cultivar "Lanka Jumbo"	24
2.9. Effects of salt stress on groundnut plants	24
2.9.1. Physiological effects	26
2.9.1.1. Relative Water Content	26
2.9.1.2. Chlorophyll content	27
2.9.2. Effects on growth	29
2.9.2.1. Plant shoot length	29
2.9.2.2. Leaf Area Index	29
2.9.2.3. Plant dry weight	30
2.9.3. Effects on yield and yield components	31

CHAPTER 3 MATERIALS AND METHODS 33

3.1. Experimental site	33
3.2. Agronomic practices	33
3.2.1. Preparation of polyethylene bags	33
3.2.2. Collection of seeds	34
3.2.3. Dibbling of seeds	35
3.2.4. Fertilizer application	35
3.2.5. Weed management	36
3.2.6. Water management	36

3.2.7. Construction of rain shelter	36
3.2.8. Gypsum application	37
3.2.9. Salt treatment	37
3.2.10. Earthing up	37
3.3. Treatment structure	37
3.3.1. Experimental design	38
3.4. Physiological measurements	39
3.4.1. Relative Water Content	39
3.4.2. Chlorophyll contents	41
3.5. Growth attributes	43
3.5.1. Plant Shoot length	43
3.5.2. Plant dry weight	43
3.5.3. Leaf Area Index (LAI)	44
3.6. Yield	44
3.7. Yield components	44
3.7.1. Number of pods per plant	44
3.7.2. Shelling percentage	45
3.7.3. 100 seed weight	45
3.8. Analysis of data	45

CHAPTER 4 RESULTS AND DISCUSSIONS **46**

4.1. General appearance of plant	46
4.1.1. Regularly watered plants	46
4.1.2. Salt stressed plants	46
4.2. Salinity in the soil	47
4.3. Physiological measurements	47

4.3.1. Relative Water Content (RWC)	47
4.3.2. Chlorophyll content	49
4.4. Growth attributes	51
4.4.1. Plant shoot length	51
4.4.2. Leaf Area Index (LAI)	53
4.4.3. plant dry weight	54
4.5. Yield	56
4.6. Yield components	58
4.6.1. Number of pods per plant	58
4.6.2. Shelling percentage	60
4.6.3. 100 seed weight	62
CHAPTER 5 CONCLUSIONS	64
SUGGESTIONS FOR FUTURE STUDIES	65
REFERENCES	66
APPENDICES	