

**COMPARISON OF SALINITY TOLERANCE BETWEEN
AVICENNIA MARINA AND *RHIZOPHORA MUCRONATA*
KARACHI COAST, PAKISTAN**



THESIS

**Maria Ashraf
30000121419034**

**MASTER PROGRAM OF ENVIRONMENTAL SCIENCE
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APPROVAL

COMPARISON OF SALINITY TOLERANCE BETWEEN
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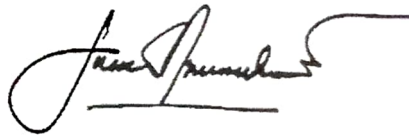
Knowing Advisory Commission

Supervisor

Co-Supervisor



Dr. Jafron Wasiq Hidayat, MSc.
NIP. 196403251990031001



Dr. Fuad Muhammad, SSi, MSi
NIP. 197306171999031003

Dean of Postgraduate School
Diponegoro University

Head of Environmental Science Master
Study Program



Dr. R.B. Sularto, S.H., M.Hum
NIP. 196701011991031005



Dr. Eng Maryono, ST, MT.
NIP. 197508112000121001

ENDORSEMENT

**COMPARISON OF SALINITY TOLERANCE BETWEEN
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KARACHI COAST, PAKISTAN**

Compiled By

Maria Ashraf
3000121419034

Has been defended in front of examiners team on June 26, 2023
and declared to have met the requirements for acceptance

Chairman

Dr. Budi Warsito, S.Si., M.Si.

Members

1. Dr. Eng. Maryono, ST, MT.

2. Dr. Fuad Muhamad, SSi, MSi

3. Dr. Jafron Wasiq Hidayat, MSc

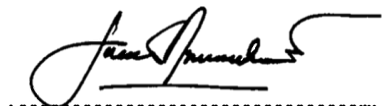
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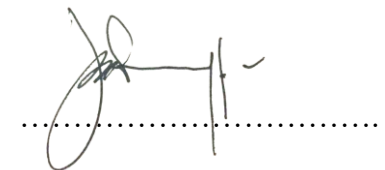
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STATEMENT

I Maria Ashraf here by certify that this work entitled as comparison of salinity tolerance between *Avicenna marina* and *Rhizophora mucronata* Karachi coast, Pakistan is truly an original work that I made myself and as a scientific work this thesis has never been submitted in any university or tertiary institution except asa fulfillment of the requirements to obtain a master degree (S-2) at Diponegoro University. To the best of my knowledge and belief, it does not include any previously published or written works by any other authors, except where due reference has been made in the text. Additionally, I certify that no portion of this work will ever again be used without the prior consent of Diponegoro Universityand, as applicable, any partner institution responsible for the joint awarding of this degree in my name for any other degree or diploma at any university or tertiary institution. If at a later date it is found that all or part of this thesis is not a result ofmy own work or plagiarism in certain parts, I agree to received the sanction of revocation of the academic degree that I hold and other sanctions in accordance with the applicable laws and regulations.

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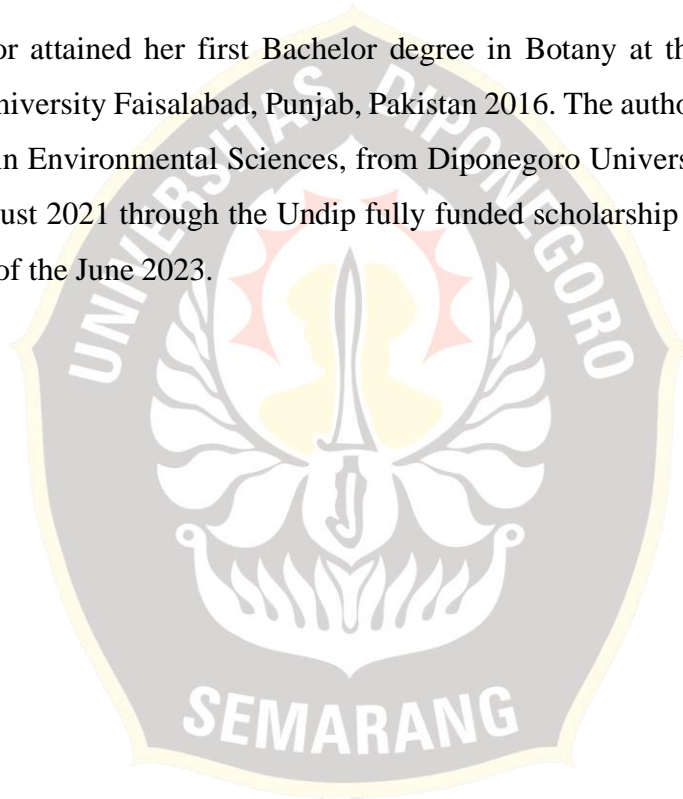
SEKOLAH PASCASARJANA

AUTHOR BIODATA



Maria Ashraf, born on March 15, 1997, in Punjab, Pakistan. The author graduated primary school in 2006 and after awards junior secondary school in 2012. Furthermore, the author continues with advanced high school and graduated in February 2014.

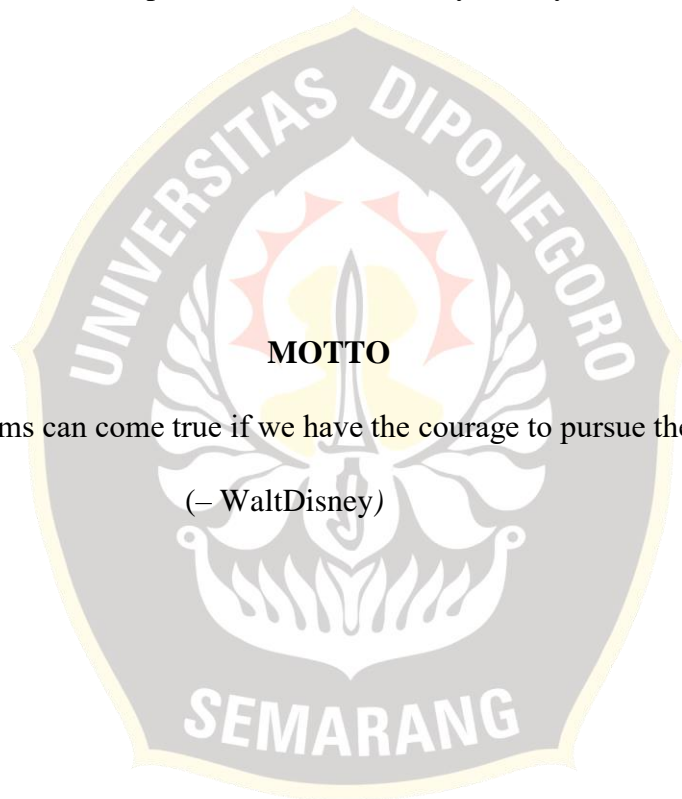
The author attained her first Bachelor degree in Botany at the Government college women university Faisalabad, Punjab, Pakistan 2016. The author continues his Master's degree in Environmental Sciences, from Diponegoro University, Semarang, Indonesia in August 2021 through the Undip fully funded scholarship and completed Master's on 26th of the June 2023.



SEKOLAH PASCASARJANA

DEDICATIONS

Firstly, I would like to dedicate my thesis to my parents who suffered a lot but supported me in my ups and down during my study career, to my sister (Mamoona Ashraf), my Aunty Uzma Parveen, my Siblings (Muhammad Usama, Muhammad Abdullah, Muhammad Marsad) and especially Dr. Muhammad Yaseen who supported me in all good and bad times. Dedications to my dearest friends (Muhammad Ayyaz, Nida Arif, Khadija Munir, Shumaila Yaseen) and to my very Respected Teacher, Professor Waqar Ahmed. Special Thanks to all my family members, Friends and Teacher.



MOTTO

“All our dreams can come true if we have the courage to pursue them.”

(– WaltDisney)

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I understand that this thesis is far from being perfect and still has room for improvement. Hence, criticism and suggestions are definitely welcome for further improvement of the thesis. Thank you.

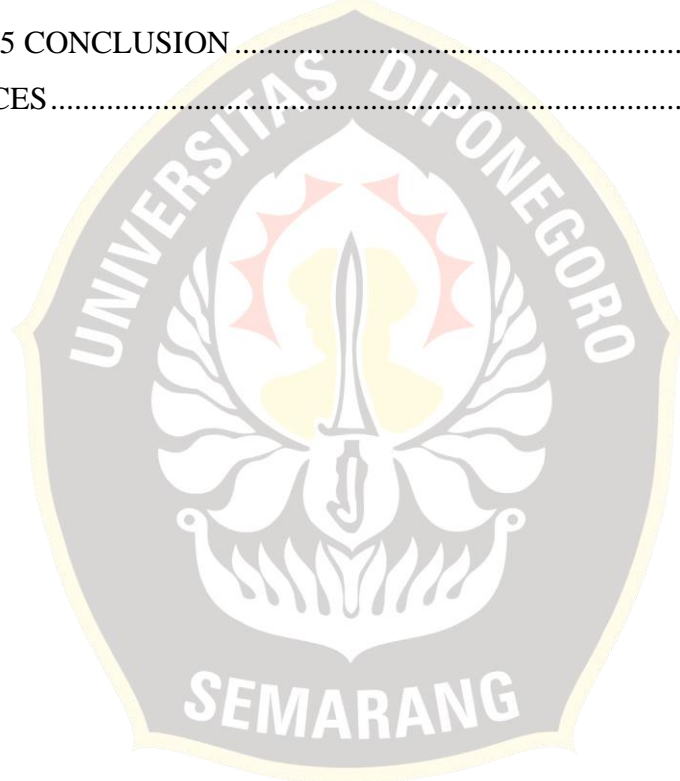
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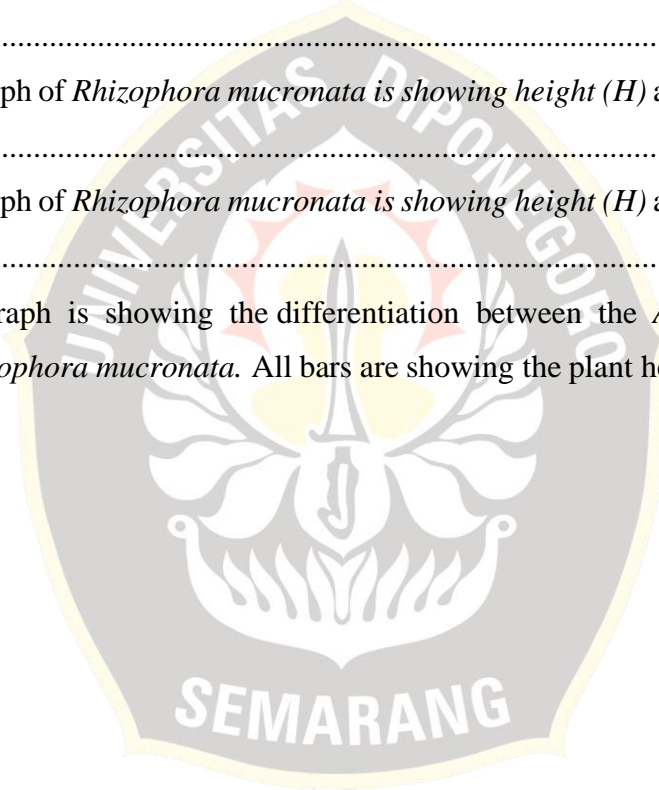
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ABSTRACT

Mangrove propagule size variation is an important factor in their survival. Propagules size variation of *Avicennia marina* and *Rhizophora mucronata* were collected from the Indus delta and has been grown in the polythene bags of 5x10 inches filled with silty soil from field nursery of "Institute of environmental studies. Different salinity and nutrient treatments were given to propagules 25% and 50% seawater and Hoagland solution. Seedlings were experimentally grown for 6 months and observed the forestry parameters i.e., initial length of plants was observed in 50% seawater and declined with increasing salinity. Fresh water has also been given thrice a week to wash out the excess salt concentration. Optimum salinity in the *Rhizophora* species was 50% seawater, *Rhizophora* species class 1 show the Plant height of $(1.057 \pm 18.962 \text{ cm})$ and class 2 show the least Plantheight $(15.304 \pm 0.995 \text{ cm})$ show maximum growth due to the given concentration of 50% sea water. Propagules of *A. marina* often show growth stimulation at low salinity 25% seawater and then a decline in growth with further increases in salinity. *Avicennia marina* class 1 show plant height $(36.45 \pm 0.61 \text{ cm})$ and class 2 shows plant height $(27.66 \pm 0.23 \text{ cm})$. Higher stomatal conductance was noted in *R. mucronata*, followed by *A. marina*. Sodium and chloride ions increased with the increase in salinity and this accumulation was much higher in *A. marina*. It was observed that medium and large size propagules show better results in artificial greenhouse environment as compared to small size of propagules.

A. marina, it is the most salt resistant mangrove species; and thus, its dominance is quite logical. *A. marina* accumulated the highest concentrations of ions followed by *R. mucronata* and *Avicennia marina* has the ability to regulate salt content by secreting it through the glands, while *R. mucronata* have the ability to exclude salts via root ultrafiltration. *A. marina* shows a positive requirement for high chloride levels for photosynthetic electron transport around photosystem. There is some evidence from the present results that root growth in this species is particularly responsive to an increase in salinity in the bathing medium. It may therefore be premature to conclude that the stimulation of halophytes growth by increased levels of salt in the growth medium is primarily due to increases in turgor pressure and extension growth the decline in growth of the plant and the corresponding decline in the root respiration rate at salinities greater than 25% seawater indicates that *A. marina* seedlings are not well adapted to conditions of salinity approaching that of seawater, in terms of optimal growth, although they are capable of tolerating conditions of very high salinity.

Keywords: *Avicennia marina*, *Rhizophora mucronata*, propagules, salinity, stomal conductance, Hoagland solution, Seawater.