

# Stress Biology

Editors

Usha Chakraborty

Bishwanath Chakraborty



Narosa

# Contents

Foreword	v
Preface	vii
Acknowledgements	ix

## ABIOTIC STRESSES

1. Heat Shock Proteins, Molecular Chaperones and Stress Response of a Model Eukaryote, the Filamentous Fungus <i>Neurospora crassa</i> <i>M. Kapoor</i>	1
2. Extending Potato Cultivation to Warmer Regions of Peninsular and Coastal India <i>J.S. Minhas and S.M. Paul Khurana</i>	13
3. Heavy Metal Stress in Plants: Metallomics Approach for Phytoremediation <i>M.N.V. Prasad</i>	21
4. Dynamics of Rhizosphere Microflora in Nutrient Deficient OBD Soil of Eastern Coal Fields <i>A.K. Roy, S.K. Choudhary, A.N. Singh and A. Arshi</i>	27
5. Alteration of Metabolic Processes in Tea following Abiotic Stresses <i>U. Chakraborty, S. Dutta, K. Maitra, K.K. Basu, G. Saha, C. Tongden and B.N. Chakraborty</i>	37
6. Changes in Pigment Composition and Photosynthetic Activities of Primary Wheat Leaves Exposed to High Light and Water Stress <i>N.K. Choudhury, R.K. Behera and P.C. Mishra</i>	44
7. <i>In Vivo</i> Measurements of Chlorophyll A Fluorescence for Estimation of Water Deficit Stress and High Light Tolerance in <i>Hevea brasiliensis</i> <i>D.B. Nair, B. Alam and J. Jacob</i>	52
8. Effect of Light and Drought on the Photosynthetic Apparatus of Young Rubber Plants ( <i>Hevea brasiliensis</i> ) <i>K. Annamalaiathan, D.B. Nair and James Jacob</i>	57
9. Influence of Soil Moisture on Physio-biochemical Parameters, Water Use and Yield of Bread Wheat ( <i>Triticum aestivum</i> L.) <i>N.K. Paul and S.A. Haider</i>	63
10. Nutrient (N,P and K) Uptake by Leaf Lamina in Relation to Water Stress in Tobacco Genotypes <i>K. Sarala, C. Chandrasekhar Rao, A.V.S.R. Swamy and K. Nageswara Rao</i>	70
11. Selection of Variant Cell Lines Showing Tolerance to Sodium Chloride (NaCl) and Water Stress (PEG) in Two Species of <i>Corchorous</i> <i>P.D. Ghosh, K. Ghosh and T.K. Maity</i>	75
12. Physiological Responses against Salt Stress by Certain Bacteria isolated from Salterns <i>V. Kannan and Hepziba Gnana Rani</i>	82

13. Selection of Salt Tolerant Genotypes in Mulberry with Particular Reference to the Identification of Molecular Markers for Tolerance <i>P.D. Ghosh, K. Vijayan and S.P. Chakraborti</i>	88
14. Effect of Salinity Stress in Okra [ <i>Abelmoschus esculentus</i> (L.) Moench] Genotypes during Germination and Initial Seedling Stage <i>B. Lahon and J.P. Srivastava</i>	95
15. Heat Stress in Yellow Condition of Fruits of <i>Solanum myriacanthum</i> Dunal and Utilization of Degraded Glycoalkaloid Available after the Treatment for the Preparation of Commercially Important 16-Dehydropregnenalacetate <i>P.K. Basu</i>	100
16. Biochemical Response of <i>Cicer arietinum</i> L. and <i>Vigna radiata</i> (L. Wilczek) to Elevated Temperature Stress <i>U. Chakraborty, M. Basnet and C. Tongden</i>	106
17. Effect of Higher Temperature on rearing of Muga silkworm, <i>Antharaea assama</i> Westwood <i>H. Mohanta, I. Biswas and N. Ray</i>	112
18. Effect of Low Temperature Preservation on Delayed Hatching of Egg of Muga silkworm, <i>Antharaea assama</i> Westwood <i>S. Ghosh and N. Roy</i>	117
19. Effect of Pesticides on Growth and Photochemical Activities of Nitrogen Fixing Cyanobacteria <i>Nostoc carneum</i> grown under Laboratory Condition <i>M. Hota, B. Nayak and N.K. Chowdhury</i>	122
20. Trimethoprim Stress Resistance by Class I Integron Borne altered Dihydrofolate Reductase Gene Cassette of an <i>E.coli</i> Isolate of Torsa River <i>S. Mukherjee and R. Chakraborty</i>	128
21. Effect of Pesticide Stresses in Relation to Lipid Peroxidation in the Liver of <i>Anabas testudineus</i> (Bloch) <i>D. Sarkar and S. Bhattacharya</i>	135
22. <i>Serratia marcescens</i> , a Potential Degradator of a Persistent Organophosphorus Pesticide- Malathion <i>V. Kannan and V. Vanitha</i>	140
23. Physiological Response of Two Gram Negative Isolates of Torsa River under Nickel Stress: Indicative of a Diverse Resistance Genetic System <i>B. Bhadra, S. Bhowal and R. Chakraborty</i>	146
24. Heavy Metal Resistance Pattern of <i>Frankia</i> isolated from Sub-Himalayan West Bengal <i>D. Bose and A. Sen</i>	154
25. High Proton mediated Phytotoxicity, Alteration of Peptide Profile and Sugar Partitioning in Germinating Seedlings of <i>Vigna radiata</i> (L.) Wilczek <i>P. Mandal and P.K. Sircar</i>	158
26. An Investigation on Establishment and Hormonal Manipulation of Growth, Metabolism and Yield of Chayote in a Stressed Agroclimatic Zone <i>T.K. Dolui, R.K. Das, U.K. Kanp, D. Chakrabarti and A. Bhattacharjee</i>	164
27. Chemical Manipulation of Seed Viability and Stress Tolerance Capacity of a Horse Gram Cultivar <i>D. Chakrabarti, R.K. Das, U.K. Kanp and A. Bhattacharjee</i>	169
28. Evaluation of Allelopathic Action of <i>Parthenium hysterophorus</i> using Differentially Aged Horse Gram Seeds <i>R.K. Bhakat, U.K. Kanp, R.K. Das and A. Bhattacharjee</i>	175

29. Evaluation of Chrysanthemum Varieties under Naturally Ventilated Low Cost Polyhouse and Open Field Conditions 181  
*I. Sarkar, T.S. Ghimiray and A. Roy*
30. Effects of Expansion of Grasslands on the Herbland Flora of Jaldapara Wildlife Sanctuary 186  
*C. Ghosh and A.P. Das*
31. Correlation Studies of Root Characteristics and Yield Involving Certain Agronomical Characters of Syngenta Hybrid Rice and Estimates of Genetic Parameters 192  
*T. Dalal, J. Tah and A. Bandyopadhyay*
32. Population Numbers and Activities of Rhizospheric Microorganisms in Soils Polluted by Effluents coming out from Bongaigaon Refinery and Petrochemicals 198  
*D. Konwar and D.K. Jha*

### BIOTIC STRESSES

33. Fungal Stresses in Plants and their Remediation 203  
*B. Rai and B.K. Singh*
34. Defense Strategies of Tea towards Foliar Pathogens 208  
*B.N. Chakraborty, S. Rana, S. Das, G. Das, R. Som, S. Datta and U. Chakraborty*
35. Induction of Resistance in Rice Plants against *Rhizoctonia solani* and Associated Changes in Defence Enzymes 216  
*A.K. Chowdhury, P. Chakraborty, M. Sharma and B.N. Chakraborty*
36. Inheritance of Resistance to Bacterial Blight (*Xanthomonas oryzae*) in Some Rice Cultivars 222  
*P. Satya and V.P. Singh*
37. Defense Responses in Tea Plants triggered by *Exobasidium vexans* 226  
*B.N. Chakraborty, M. Sharma and R. Das Biswas*
38. Changes in Oxidative Stress and Defense related Enzymes of Tea Leaves following Attack by *Helopeltis theivora* 233  
*U. Chakraborty, N. Chakraborty, R. Das Biswas and B.N. Chakraborty*
39. Reduction of Disease Incidence in Young Tea Plants against *Curvularia eragrostidis* by Biotic and Abiotic Elicitors 238  
*A. Saha, S. Dasgupta, P. Mandal and D. Saha*
40. Studies on Occurrence and Succession of Pests of Maize under Terai Ecological Conditions of West Bengal 243  
*S. Pal and S. Bandyopadhyay*
41. Efficacy of Two Rhizobacterial Strains on Growth Promotion, Nodulation and Disease Control of Pigeon Pea in Presence of a Rhizobial Strain in Soil Infested with *Fusarium udum* 247  
*S. Dutta, A.K. Mishra and B.S. Dileep Kumar*
42. Interaction of *Bacillus pumilus* with Tea Root Rot Pathogens 252  
*U. Chakraborty, M. Basnet, P. Roy Chowdhury and B.N. Chakraborty*
43. Present and Future Perspectives of Managing Biological Stresses for Optimum Yield and Quality of Tea 257  
*M.P. Sinha*
44. A New Report on Plant Bug, *Helopeltis antonii* Signoret causing Die-back of Chilli ("Dollo Khorsani") and its Host at Mid-hill of Darjeeling 261  
*P.P. Dhar, J. Mandal, N. Laskar and A. Roy*

45. Evaluation of Some Early Duration Rice Varieties in Mid-hills of West Bengal	265
<i>T.S. Ghimiray, N. Laskar and B.R. Sharma</i>	
46. Assessment of Key Mortality Factors in the Population Dynamics of Bihar	269
Hairy Caterpillar ( <i>Diacrasia obliqua</i> )	
<i>M. Das and N. Chaudhuri</i>	
Author Index	275
List of Committee	277