

CONTENTS

CHAPTER 1: INTRODUCTION	1-5
CHAPTER 2: REVIEW OF LITERATURE	6-36
2.1a. Lichen and its forms	6
2.1b. Diversity of photobiont and mycobiont in lichens	6
2.2. Industrial and Medicinal significance of lichen	7
2.3. Antimicrobial activity of higher vascular plants	8
2.4. Antimicrobial activity of lower plant groups	10
2.4.1. Antimicrobial activity of Algae	10
2.4.2. Antimicrobial activity of Bryophytes	11
2.4.3. Antimicrobial activity of Fungi	12
2.5. Antibacterial and antifungal activity of lichens	12
2.6. Antiviral and antitumour activity of lichens	19
2.7. Antioxidant activity of plants	21
2.8. Antioxidant activity of lichens	26
2.9. Synergistic activity	29
2.10. Spectral analysis of lichens and other plants	33
2.11. Review on Methodology for determination of antimicrobial antioxidant activity of lichen extracts	34
CHAPTER 3: MATERIALS AND METHODS	37-58
3.1 Media used	37
3.2 Reagents used	37
3.3 Instrument used	41
3.4 Methodology	42
3.4.1. Area of Study	42
3.4.2. Sampling sites	45
3.4.3.a Collection of lichen samples	46
3.4.3. b. Collection of medicinal plant samples:	46
3.4.4 Extraction of sample extracts	46
3.4.5 Extract yield (%) of extracts	47
3.4.6 Test microorganisms	48
3.4.7 Screening of antimicrobial activity	49
3.4.8 Determination of minimal inhibitory concentration of extracts against test microorganisms	49
3.4.9 DPPH radical scavenging assay	52
3.4.10 Determination of Reducing power ability	52
3.4.11 Determination of total antioxidant capacity	53
3.4.12 Estimation of total flavonoid content	53
3.4.13 Determination of total phenolics	54
3.4.14 Catalase activity	55

3.4.15. Peroxidase activity	55
3.4.16. Effect of lichen extracts on total protein content of the test microorganism grown culture filtrate	56
3.4.17. Effect of lichen extracts on the growth of the test microorganisms	56
3.4.18. Preliminary separation of lichen compounds by TLC	57
3.4.19. TLC bioautography of lichen extracts	57
3.4.20. Identification of active principle in lichen extract with the help of LCMS mass spectrum	58
3.4.21. Statistical analysis	58

CHAPTER4: RESULTS AND DISCUSSION

4.1. Lichen samples	59
4.2. Morphological properties of lichen samples under study	60
4.3. Extraction of lichen samples and percentage yield of extract residue	60
4.4. Screening of antimicrobial activity of lichen extracts and some common medicinal plants	63-74
4.4.7. Screening antimicrobial activity of combined extracts of lichens and medicinal plants	74-90
4.5. Determination of Minimum Inhibitory Concentration (MIC) of lichen extracts	90
4.6. Determination of Minimum Inhibitory Concentration (MIC) of medicinal plant extracts	95
4.7. Determination of MIC of combined extract of lichen and medicinal plants	98
4.8.1-4.8.6 Estimation of DPPH radical scavenging activity of lichens	109
4.8.7. Estimation of DPPH radical scavenging activity of medicinal plants	114
4.9. Estimation of DPPH radical scavenging activity of lichen extracts in combination with medicinal plants	116
4.10.1. Estimation of total antioxidant activity of lichens under study	119
4.10.2 Estimation of total antioxidant activity of medicinal plants under study	120
4.11. Total antioxidant activity of lichen and medicinal plant in combination	122
4.12. Reducing power ability of lichen extracts under study	124
4.13 Estimation of Total phenolic content of lichens under study	127
4.14 Estimation of total flavonoid content of lichens under study	131

4.15 Estimation of Catalase and Peroxidase activity of studied lichens	132
4.16. Determination of Total protein content of culture filtrate containing lichen extract	135-145
4.17 Determination of effect of lichen extract on growth of microorganisms	146-169
4.18 Preliminary separation of lichen compounds by TLC	170
4.19 Determination of the bioactive lichen compounds using TLC bioautography	172
4.20. Different lichen compounds identified on the basis of LCMS chromatogram	175
CHAPTER 5. SUMMARY AND CONCLUSION	194
CHAPTER6. REFERENCES	199
APPENDICES	(A-N)