

Contents

Subject	Page
Abstract	
1. Introduction	1
2. Review of literature	3
2.1. Environmental interactions with aquaculture	3
2.2. Water quality	3
• Temperature	5
• Dissolved oxygen	6
• pH	8
• Total alkalinity	8
• Total hardness	9
• Secchi-disk visibility	9
• Salinity	10
• Nitrogenous compounds in pond waters	11
• Total ammonia	12
• Nitrite	14
• Nitrate	15
• Phosphorus	16
2.3. Fertilizers	17
2.4. Plankton	19
2.5. Phytoplankton importance in aquatic environment	20
2.6. Artificial feeding:	21
2.7. Fish stocking and multi-species poly-culture	21
2.8. Fishpond management	22
2.9. The effect of pond management on water quality variables	22
2.10. Factor affecting phytoplankton growth	23

• Temperature	23
• Light	23
• Salinity	23
• Nutrients	24
2.11. Zooplankton	25
2.12. Aquatic bacterial count	27
2.13. Chemical composition of fish	28
 3. Material and methods	 29
3.1. Experimental design	29
3.1.1. Field experiments	29
• The first experiment	29
• The second field experiment	30
3.1.2. Batch experiments	32
• Isolation, identification and purification of algae	32
• Algal culture	32
• Aeration of cultures	33
• Flask stage	34
• Effect of salinity concentration on growth of <i>Chlorella vulgaris</i>	34
• Effect of light intensity on growth of <i>Chlorella vulgaris</i>	34
• Effect of temperature on growth of <i>Chlorella vulgaris</i>	34
3.2. Analytical procedures	35
3.2.1. Water analyses	35
3.2.1.1. Physico-chemical analyses	35
• Temperature and dissolved oxygen	35
• pH	35
• Water transparency	35
• Salinity	35
• Total ammonia	36
• Unionized ammonia and total ammonia	36
• Nitrate	36
• Dissolved orthophosphate	37

• Total alkalinity	37
• Total hardness	38
3.2.1.2. Biological analyses	39
• Phytoplankton	39
• Zooplankton	39
• Bacteriological examination	40
3.2.2. Fish analysis	40
3.2.2.1. Proximate analysis	40
• Moisture content	41
• Crude protein content	41
• Fat ether extract	42
• Ash content	42
3.3. Statistical analysis	42
 4. Results	 43
4.1. Field experiment	43
4.1.1. First experiment (poly-culture management)	43
4.1.1.1. Physico - chemical analysis of water	43
• Water temperature	43
• Dissolved oxygen	43
• Sicchi disk	43
• pH	43
• Unionized ammonia	44
• Salinity and electric conductivity	44
• Total alkalinity	44
• Total hardness	44
• Nitrite	44
• Nitrate	45
• Orthophosphate	45
• Total phosphorus	45
4.1.1.2. Biological analysis of water	46
• Phytoplankton dynamics	46

• Zooplankton	46
• Total bacterial count	47
4.1.1.3. Proximate analysis of fish	47
 4.1.2. Second experiment (mono-culture management)	 60
4.1.2.1. Physico - chemical analysis of water:	60
• Water temperature	60
• Dissolved oxygen	60
• Secchi-disk	60
• pH	60
• Unionized ammonia	61
• Salinity and electric conductivity	61
• Total alkalinity	61
• Total hardness	61
• Nitrite	61
• Nitrate	62
• Orthophosphate	62
• Total phosphorus	62
4.1.2.2. Biological analysis of water	62
• Phytoplankton dynamics	62
• Zooplankton	63
• Total bacterial count	63
4.1.2.3. Proximate analysis of fish	64
 4.2. batch experiment	 77
4.2.1. Growth response of <i>Chlorella vulgaris</i> to various salinity concentrations	77
4.2.2. Growth response of <i>Chlorella vulgaris</i> to various light intensities	78
4.2.3. Growth response of <i>Chlorella vulgaris</i> to various temperature degrees	79
 5.Discussion	 81
Field experiment	81
Physico - chemical analysis of water:	81

• Temperature	81
• Dissolved oxygen	82
• pH	82
• Secchi-disk	83
• Ammonia	83
• Salinity	84
• Total hardness	85
• Total alkalinity	85
• Nitrite	86
• Nitrate	86
• Total phosphorus	87
• Ortho phosphate	87
Biological analysis of water	88
• Phytoplankton abundance	88
• Zooplankton	89
• Total bacterial counts	91
Proximate analysis of fish	92
II- batch experiments	92
A- Growth response of <i>Chlorella vulgaris</i> to various salinity concentrations	92
B- Growth response of <i>Chlorella vulgaris</i> to various light intensities	93
C- Growth response of <i>Chlorella vulgaris</i> to various temperature degrees	94
6.Summary and conclusions	97
References	103
Arabic summary	